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1966 REVISIONS TO  
1963 STANDARD DRAWING BOOK FOR  
ROAD & BRIDGE CONSTRUCTION

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STATE HIGHWAY COMMISSION  
HELENA, MONTANA  
March 1, 1966

STANDARD DRAWING BOOK

We are sending the following additions and/or revisions effective March 1, 1966, to be included in your present Standard Drawing Book, the green covered one, original issue May 1, 1963:

✓ 39-01	8" P.C. Concrete Pavement Sawed Joints With Tie Bars
✓ 39-03	8" P.C. Concrete Pavement Sawed Joints
✓ 39-04	8" P.C. Concrete Pavement Construction Joint and Header
✓ 39-09	8" Concrete Pavement Keyway Joints
✓ 66-01	Stock & Vehicular Underpass & Drainage Structures S.P.P.A.
✓ 74-06A	Precast Traffic Curb
✓ 74-08	Concrete Edge Protection For Structural Plate Pipe Culvert & For S.P.P.A.
88-09	Signing of Median U Turns
88-16	X1-1 Sign & Erection Detail
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100-08	Two Table Picnic Shelter
88-06	Primary Highway Mileposts
88-13	Standard R2-11, R4-10, & R4-11 Signs
88-60	Guide Sign Placement

NOTE:

- (1) Add these drawings to your book.
- (2) We are also sending a complete new index. You should destroy the old index.

  
Morris Griffith  
Office Engineer



STATE HIGHWAY COMMISSION  
HELENA MONTANA

Date Issued  
April 1, 1965  
Rev. 5-1-65  
Rev. 8-1-65  
Rev. 3-1-66

Transmitted herewith are the Standard Drawings which are supplementary to the Standard Specifications. A new Table of Contents has been made.

The original Drawings became effective May 1, 1963 and this tabulation also includes the subsequent revisions, additions and deletions. In the future when new drawings are sent, the superseded drawings should be retained until no longer applicable.

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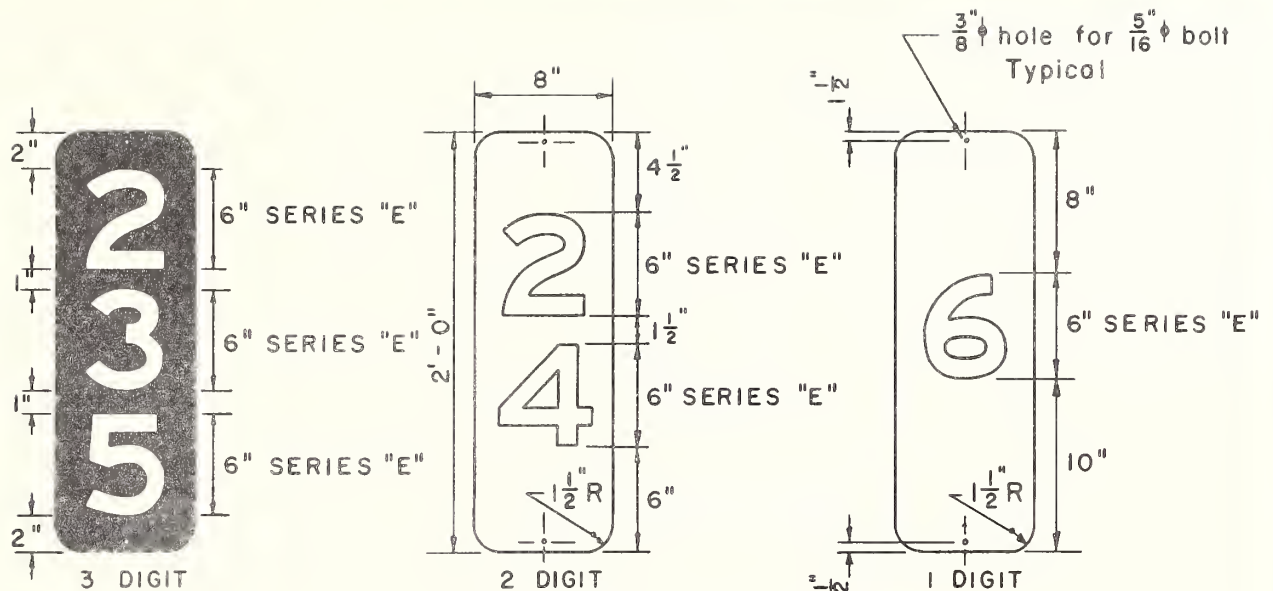
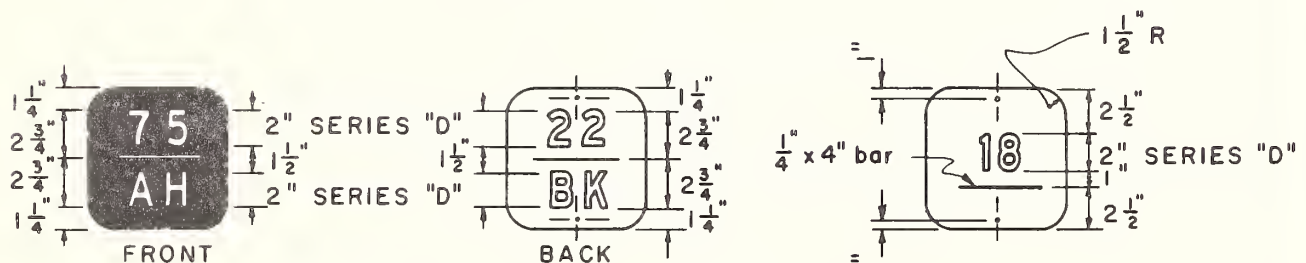
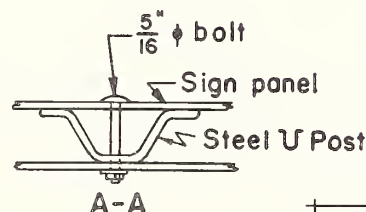
100-01 Outdoor Fireplace - Added 8-1-65  
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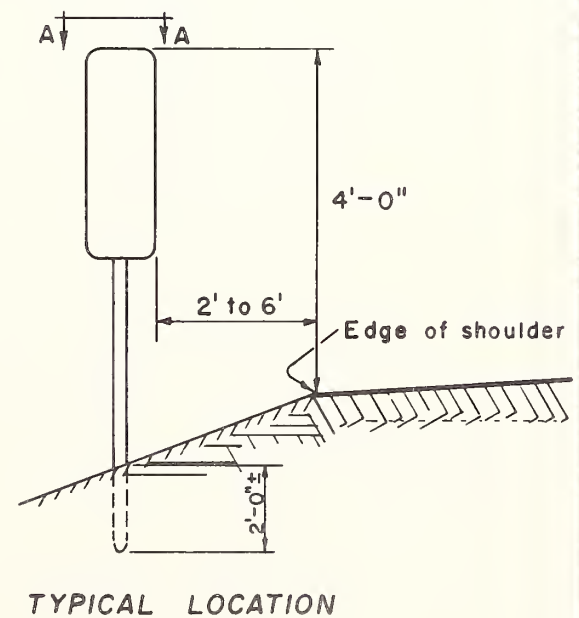
State Highway Commission  
Helena, Montana

## PRIMARY HIGHWAY MILEPOSTS

Approved  
*William H. Brown*  
State Highway EngineerMILE POST  
0'-8" x 2'-0"EQUATION  
SUPPLEMENTARY  
PLATES  
0'-8" x 0'-8"INTERMEDIATE  
SUPPLEMENTARY  
PLATE  
0'-8" x 0'-8"

## NOTES:

1. Mile post shall be in general alignment with the delineators and/or signs.
2. When an equation is posted a supplementary plate will be placed below the standard mile post giving the decimal of a mile to the nearest hundredth.
3. When an intermediate point is posted a supplementary plate will be placed below the standard mile post giving the decimal of a mile at that point to the nearest hundredth.
4. Mile posts and supplemental plates will have white reflectorized letters on a green reflectorized background.
5. Bolts shall be galvanized or cadmium plated steel or aluminum. Posts shall be 2 lb. per foot steel U posts, galvanized or painted.

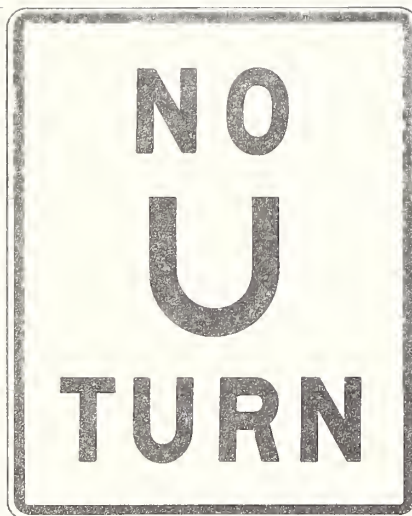
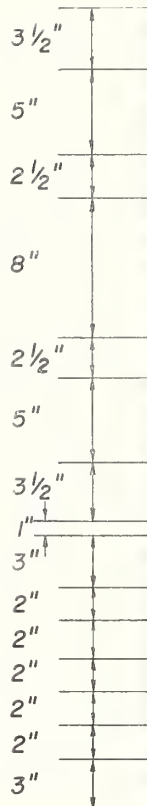


TYPICAL LOCATION



# SIGNING OF MEDIAN U-TURNS

R3-4  
24 x 30



5" Series D

8" Series F

5" Series D



2" Series C

2" Series C

2" Series C

**NOTE:**

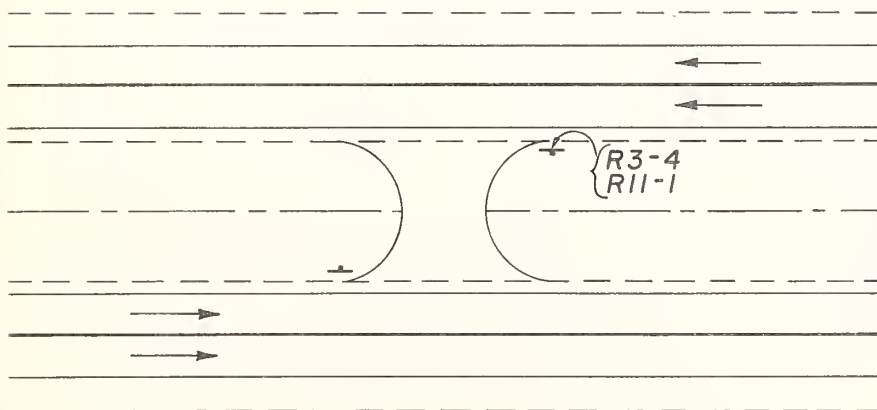
R3-4 and R11-1 shall have black legend on white reflectorized background.

Margin =  $\frac{3}{8}$ "

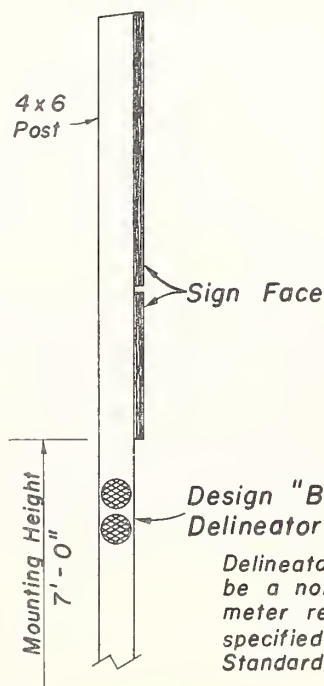
Border =  $\frac{5}{8}$ "

Corner Radius =  $1\frac{1}{2}$ "

R11-1  
24 x 16



U-TURN MEDIAN OPENINGS  
(See Std. Dwg. 20-05)

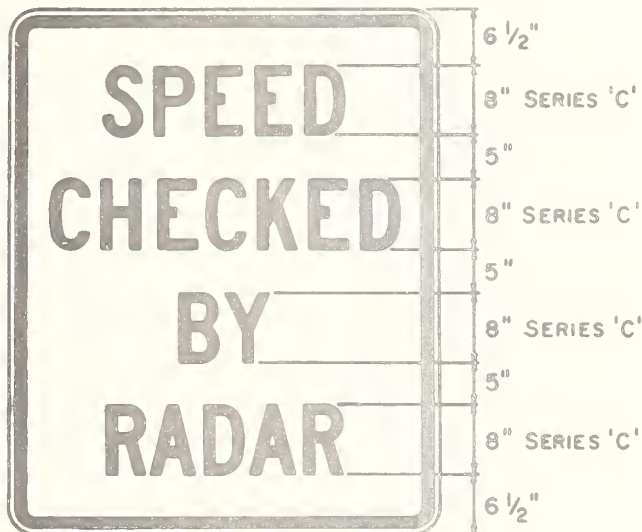


MOUNTING DETAIL

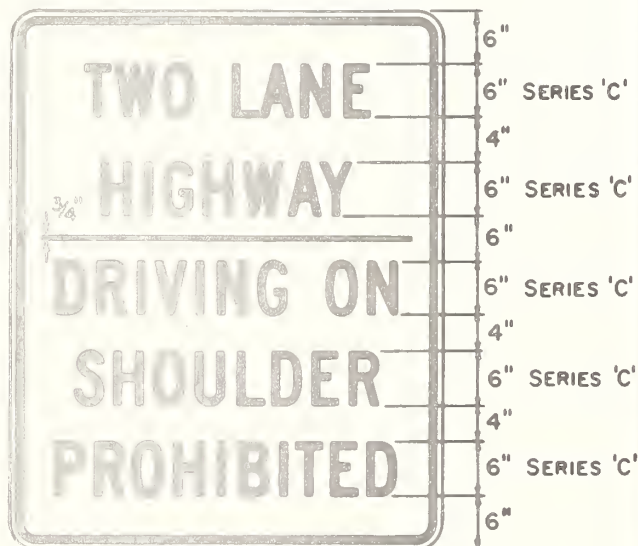
Delineator button shall be a nominal 3" diameter reflector as specified by Art. 90.41(G) Standard Specifications.







R2-11



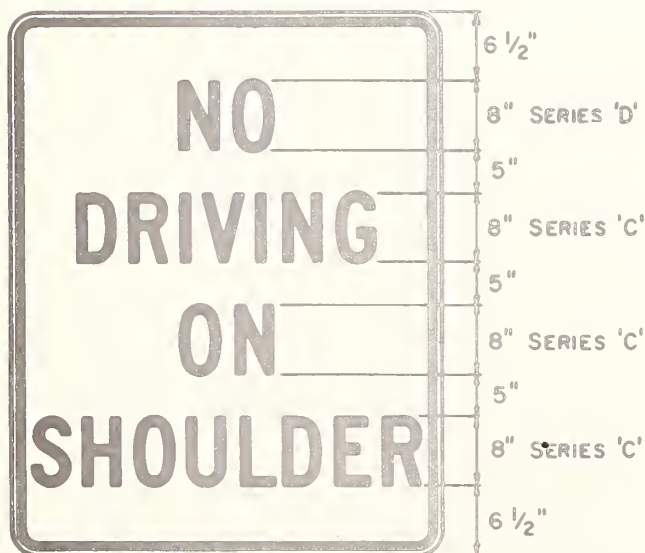
R4-10

**NOTE:**

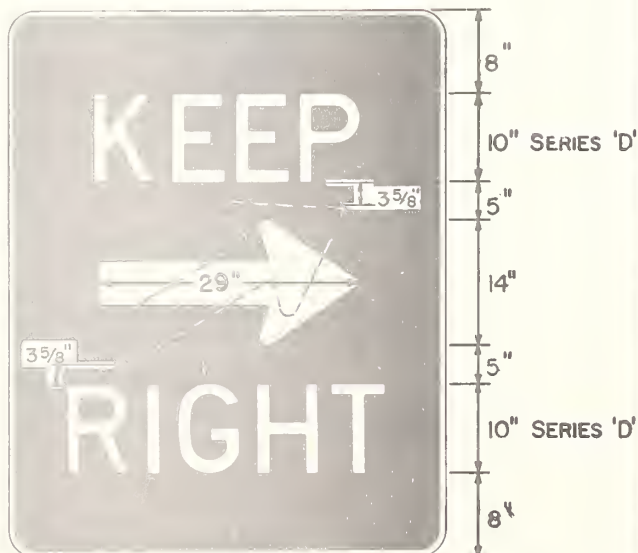
ALL SIGNS ON THIS SHEET ARE 48" X 60".

THE R2-11, R4-10 & R4-11 SIGNS HAVE 3/4" MARGINS 7/8" BORDERS AND 3" CORNER RADII. THEY ARE BLACK ON REFLECTORIZED WHITE.

THE R4-7 SIGN IS REFLECTORIZED WHITE ON BLACK WITH A 1" BORDER AND 3" CORNER RADII.



R4-11



R4-7



Drawn 3-1-63

Last Revision 3-1-66

STANDARD DRAWING NO. 88-16

State Highway Commission  
Helena, Montana

# X1-1 SIGN & ERECTION DETAIL

Approved

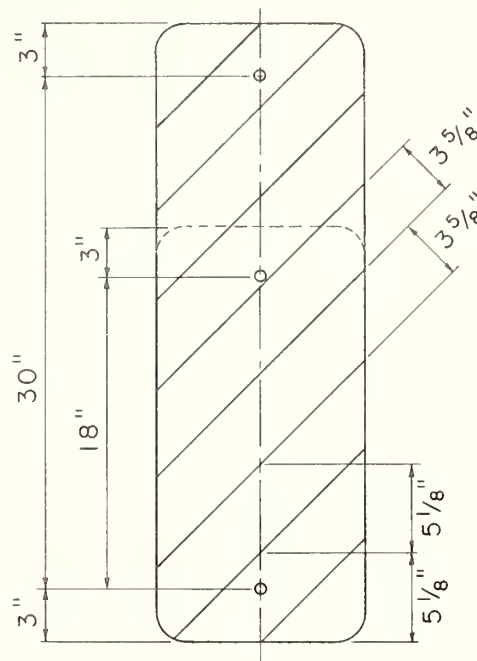
State Highway Engineer



12" X 24"



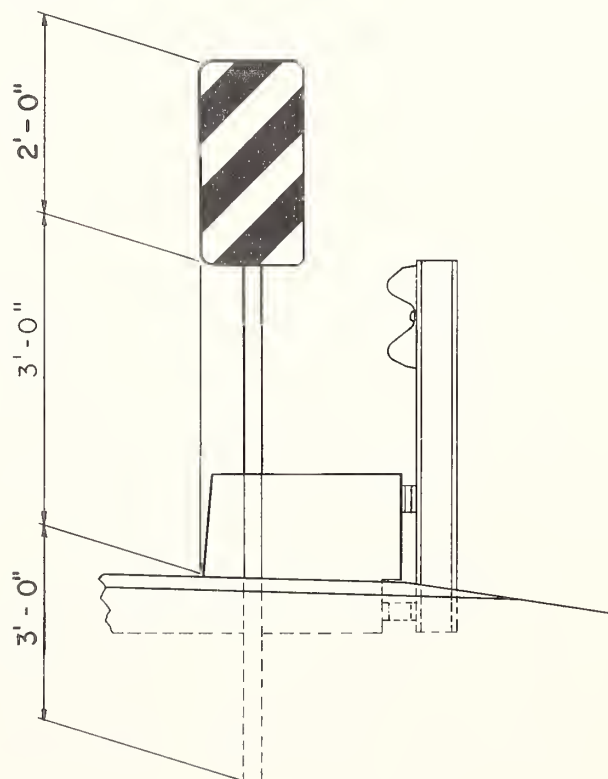
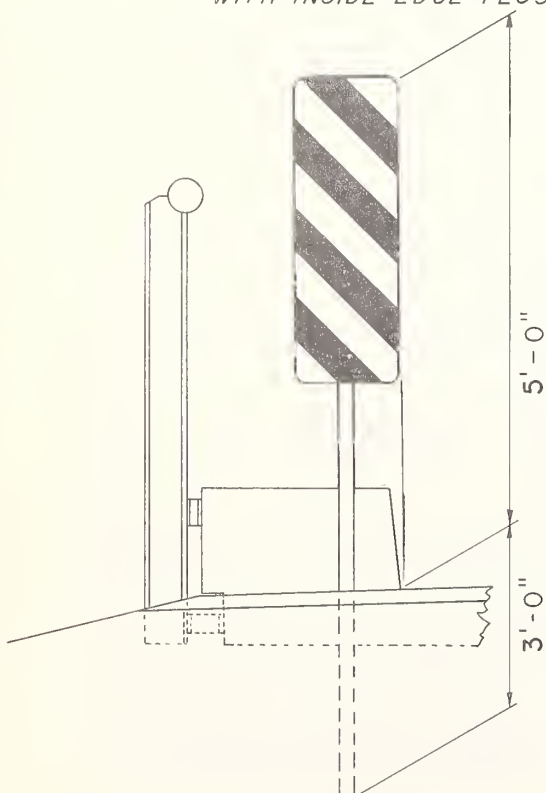
12" X 36"



## NOTE:

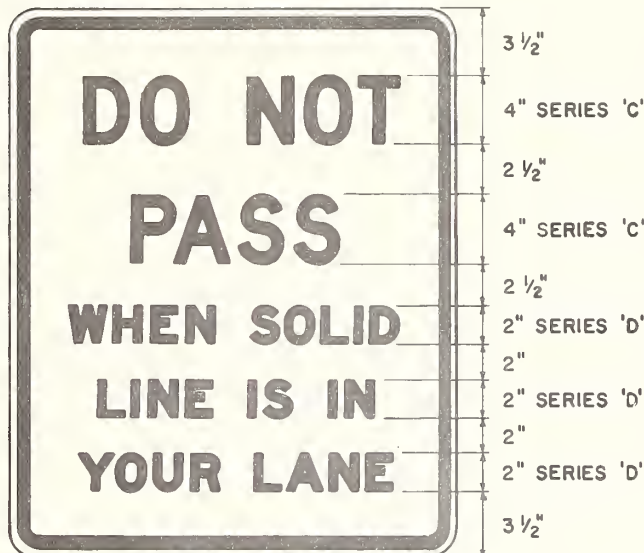
STRIPES SHALL BE BLACK AND REFLECTORIZED WHITE.

PANELS SHALL BE MOUNTED ON STEEL U POSTS, 2 LBS./FT.,  
WITH INSIDE EDGE FLUSH WITH FACE OF CURB.

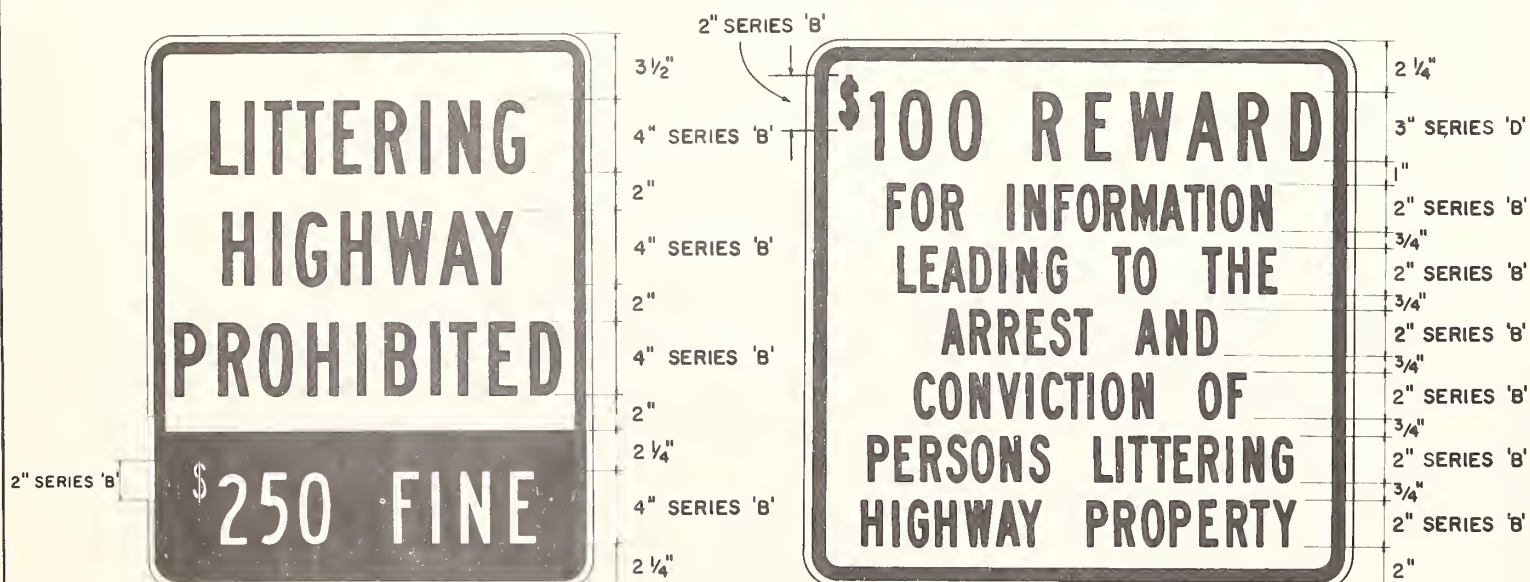








R4-12  
24 X 30  
MARGIN = 3/8"  
BORDER = 5/8"  
CORNER RADIUS = 1 1/2"



R10-8  
24 X 30  
MARGIN = 3/8"  
BORDER = 5/8"  
CORNER RADIUS = 1 1/2"

R10-9  
24 X 24  
MARGIN = 3/8"  
BORDER = 5/8"  
CORNER RADIUS = 1 1/2"



Drawn 3-1-66

Last Revision

STANDARD DRAWING NO.

88 - 20

State Highway Commission  
Helena, Montana

W8-9, W9-2, W9-5, & W9-6 WARNING SIGNS

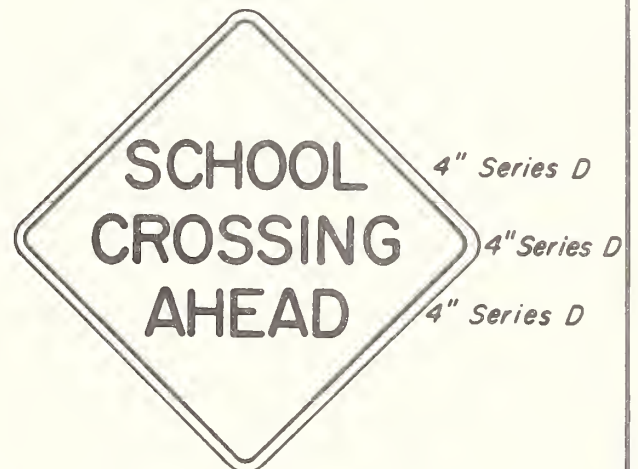
Approved  
*Paul W. Johnson*  
State Highway Engineer



W8-9  
30 X 30

**NOTE**

Warning sign W8-9 shall have black legend and borders on a reflectorized yellow background. The Bureau of Public Roads "STANDARD ALPHABET" shall be used.



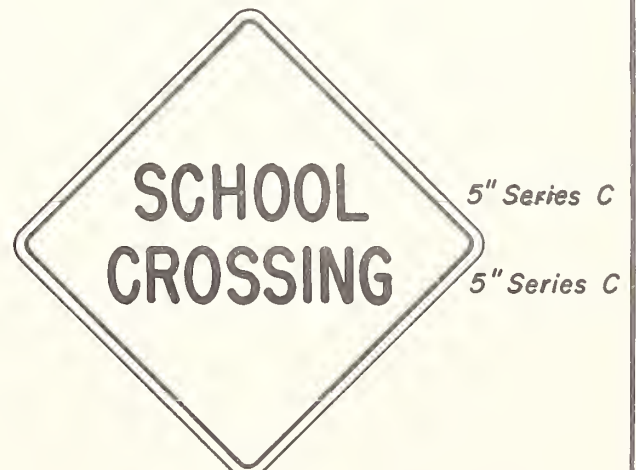
W9-5  
30 X 30

**NOTE**

Warning signs W9-2, W9-5, & W9-6 shall have black legend and borders on a yellow background. The Bureau of Public Roads "STANDARD ALPHABET" shall be used.



W9-6  
30 X 30



W9-2  
30 X 30



Drawn 3-1-66	Last Revision	STANDARD DRAWING NO. 88 - 21
State Highway Commission Helena, Montana	WARNING SIGN PANEL SPECIFICATIONS	Approved State Highway Engineer

SIGN NO.	PANEL SIZE	LETTER SIZE	MARGIN	BORDER	CORNER RADIUS	HOLE CENTERS	
						VERT.	HORZ.
W1-1	30 X 30		1/2	3/4	1 7/8	30	
W1-2	30 X 30		1/2	3/4	1 7/8	30	
	36 X 36		5/8	7/8	2 1/4	36	
	48 X 48		3/4	1 1/4	3	22	36
W1-3	30 X 30		1/2	3/4	1 7/8	30	
W1-4	30 X 30		1/2	3/4	1 7/8	30	
	36 X 36		5/8	7/8	2 1/4	36	
	48 X 48		3/4	1 1/4	3	22	36
W1-5	30 X 30		1/2	3/4	1 7/8	30	
	36 X 36		5/8	7/8	2 1/4	36	
W1-6 W1-7	48 X 24		1/2	3/4	1 7/8	18	30
W3-1	30 X 30	6" D, 6" C	1/2	3/4	1 7/8	30	
	36 X 36	7" D, 7" C	5/8	7/8	2 1/4	36	
W3-2	30 X 30	6" C	1/2	3/4	1 7/8	30	
	36 X 36	7" C	5/8	7/8	2 1/4	36	
W3-3	36 X 36	6" D	5/8	7/8	2 1/4	36	
W4-1	30 X 30	5" C	1/2	3/4	1 7/8	30	
	36 X 36	6" C	5/8	7/8	2 1/4	36	
	48 X 48	8" C	3/4	1 1/4	3	22	36
W4-2	36 X 36	SEE STANDARD DRWG. NO. 88-14	5/8	7/8	2 1/4	36	
	48 X 48		3/4	1 1/4	3	22	36
W5-1	30 X 30	5" D	1/2	3/4	1 7/8	30	
	36 X 36	6" D	5/8	7/8	2 1/4	36	
W6-1	36 X 36	5" D	5/8	7/8	2 1/4	36	
	48 X 48	7" D	3/4	1 1/4	3	22	36
W6-2	36 X 36	5" D	5/8	7/8	2 1/4	36	
	48 X 48	7" D	3/4	1 1/4	3	22	36
W6-4	48 X 48	9" C, 9" C	3/4	1 1/4	3	22	36
W6-5	30 X 30	6" C, 6" C	1/2	3/4	1 7/8	30	
	36 X 36	8" C, 8" C	5/8	7/8	2 1/4	36	
W10-1	36 DIA.	8" E, 3 3/4" BARS	1/2	3/4		30	
W12-3	30 X 15	6" C NUMERALS 8" C LETTERS	3/8	7/8	1 7/8	24	
W13-1	18 X 18	8" C, 3" E	3/8	3/8	1 1/2	15	
	24 X 24	10" C, 4" E	3/8	5/8	1 1/2	18	
W13-5	30 X 36	5 E, 10 E, 4 E	1/2	3/4	1 7/8	30	
	48 X 60	8 E, 16 E, 6 E	3/4	7/8	3	26	30
X1-1	12 X 24				1 1/2	18	
	12 X 36	3 5/8" BARS			1 1/2	30	
X3-2	15 X 15	NINE 3"			1 1/2	15	
	18 X 18	REFLECTOR BUTTONS			1 1/2	15	





Drawn 3-1-66	Last Revision	STANDARD DRAWING NO. 88-22
State Highway Commission Helena, Montana	REGULATORY SIGN PANEL SPECIFICATIONS	Approved State Highway Engineer

SIGN NO.	PANEL SIZE	LETTER SIZE	MARGIN	BORDER	CORNER RADIUS	HOLE CENTERS	
						VERT.	HORZ.
R1-1	24 X 24	8" C		5/8		18	
	30 X 30	10" C		3/4		24	
	36 X 36	12" C		1		30	
R1-2	36 X 36 X 36	6" D	3/8	5/8	1 1/2	24	
	60 X 60 X 60	10" D	5/8	1	2 1/2	40	
R2-1	24 X 30	4" E, 4" E, 10" E	3/8	5/8	1 1/2	24	
	48 X 60	8" D, 8" D, 16" D	3/4	7/8	3	26	30
R2-2A	24 X 30	4" D, 4" D, 4" D, 8" E	3/8	5/8	1 1/2	24	
	48 X 60	8" D, 8" D, 8" D, 16" E	3/4	7/8	3	26	30
R2-3A	24 X 30	4" D, 4" D, 4" D, 8" E		1/2	1 1/2	24	
	48 X 60	8" D, 8" D, 8" D, 16" E		1	3	26	30
R2-11	24 X 30	4" C	3/8	5/8	1 1/2	24	
	48 X 60	8" C	3/4	7/8	3	26	30
R2-12	132 X 84	10" D					
		8" D, 5" C	1/2	2	12		
		8" D					
		8" D					
R3-1 & R3-2	24 X 30	6" D, 5" D, 5" D	3/8	5/8	1 1/2	24	
	48 X 60	12" D, 10" D, 10" D	3/4	7/8	3	26	30
R3-4	24 X 30	5" D, 8" F, 5" D	3/8	5/8	1 1/2	24	
	48 X 60	10" D, 16" F, 10" D	3/4	7/8	3	26	30
R3-5	30 X 36	6" D	1/2	3/4	1 7/8	30	
R3-6	30 X 36		1/2	3/4	1 7/8	30	
R3-7	30 X 30	4" C, 5" C, 4" C	1/2	3/4	1 7/8	24	
R3-8	30 X 30	4" D	1/2	3/4	1 7/8	24	
R4-1	24 X 30	6" D	3/8	5/8	1 1/2	24	
	48 X 60	12" D	3/4	7/8	3	26	30
R4-2	24 X 30	6" C	3/8	5/8	1 1/2	24	
	48 X 60	12" C	3/4	7/8	3	26	30
R4-3	24 X 30	4" D	3/8	5/8	1 1/2	24	
	48 X 60	8" D	3/4	7/8	3	26	30
R4-7	24 X 30	5" D		1/2	1 1/2	24	
	48 X 60	10" D		1	3	26	30
R4-10	24 X 30	3" C	3/8	5/8	1 1/2	24	
	48 X 60	6" C	3/4	7/8	3	26	30
R4-11	24 X 30	4" D, 4" C, 4" C, 4" C	3/8	5/8	1 1/2	24	
	48 X 60	8" D, 8" C, 8" C, 8" C	3/4	7/8	3	26	30
R5-1	24 X 24	6" C	3/8	5/8	1 1/2	18	
	36 X 36	8" D	5/8	7/8	2 1/4	30	
R6-1	36 X 12	4" D		3/8	1 1/2	9	
R6-3	24 X 30	5" C	3/8	5/8	1 1/2	24	
	48 X 60	10" C	3/4	7/8	3	26	30
R6-8	24 X 30	5" C	3/8	5/8	1 1/2	24	
R6-4	24 X 30	6" D	3/8	5/8	1 1/2	24	
R10-1	24 X 30	5" C	3/8	5/8	1 1/2	24	
	48 X 60	10" C	3/4	7/8	3	26	30





Drawn 3-1-66	Last Revision	STANDARD DRAWING NO.	88 - 23
State Highway Commission Helena, Montana	ROUTE MARKER PANEL SPECIFICATIONS		Approved <i>Charles E. Langer</i> State Highway Engineer

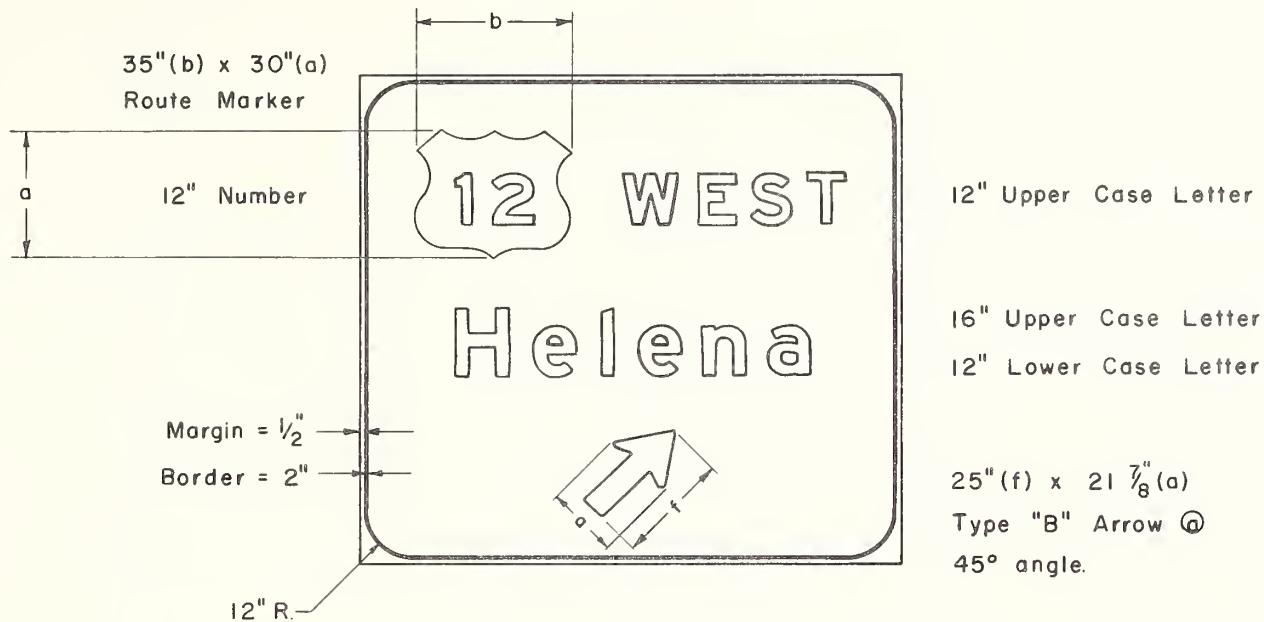
SIGN NO.	PANEL SIZE	LETTER SIZE	MARGIN	BORDER	CORNER RADIUS	HOLE CENTERS	
						VERT.	HORZ.
M1-1	24 X 24 28 X 24	3" E, 10" D	9/16	3/4		18	
M1-2	24 X 24	1 DIGIT 12" D 2 DIGIT 12" C			1 1/2	18	
M1-3	21 X 18	1 7/8" C 1 1/8" D 6" D		9/16		15	
M1-4	24 X 24	2 1/2" C 1 1/2" D 8" D		3/4		18	
	36 X 36	3 3/4" C 2 1/4" D 12" D		1 1/8		30	
M1-5	24 X 24	2 1/2" C 1 1/2" D 8" D		3/4		18	
	36 X 36	3 3/4" C 2 1/4" D 12" D		1 1/8		30	
M1-6	24 X 24	1 DIGIT 10" E 2 DIGIT 10" D 3 DIGIT 10" C		1 1/2	1 1/2	18	
M1-7	24 X 24	7" C			1 1/2	18	
M2-1 M2-1A	21 X 15	9" C	3/8 *	3/8	1 1/2	12	
M3-1 M3-1A THRU M4-7	21 X 15		3/8 *	3/8	1 1/2	12	18 †
M5-1	21 X 9	4" B	3/8	3/8	1 1/2	6	18 †
M5-2	21 X 9	4" B	3/8	3/8	1 1/2	6	18 †
M5-3	21 X 9	5" B	3/8	3/8	1 1/2	6	18 †
M5-5	21 X 9	4" B	3/8	3/8	1 1/2	6	18 †
M5-6	21 X 9	5" B	3/8	3/8	1 1/2	6	18 †
M6-1 M6-1A THRU M6-4 M6-4A	21 X 9	5" C	3/8 *	3/8	1 1/2	6	18 †
M6-1B THRU M6-4B	30 X 15	7" C		1/2	2	12	
M7-1	18 X 12	7" C	3/8	3/8	1/2	9	15 †

#### NOTES

(†) Holes for these signs must be spaced horizontally when mounted with back braces. See Standard Drawings No. 88-51 & 88-51A. Generally speaking, the vertical hole spacing will only be necessary when a single column of route markers is mounted on a treated timber post.

(\*) Signs having numbers ending in A or B shall not have a margin.





Dimensions shown are typical only; see plans for actual sizes

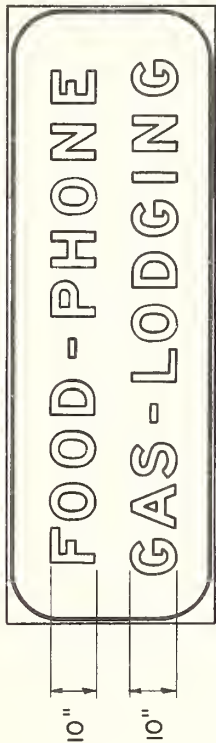
### SIGN DESIGN SPECIFICATIONS

Smaller Dimension of Sign	Corner Radius	Largest Letter on Sign	Margin	Border
0'-0" TO 2'-6"	3"	8" Letters or Less	1/2"	1"
3'-0" TO 4'-6"	6"	Greater Than 8"	1/2"	2"
5'-0" TO 6'-6"	9"			
7'-0" & Greater	12"			

### NOTES

- All Interstate and U.S. Route Markers, and all Arrows used on Guide Signs must conform to those shown in the AASHO "Manual for Signing and Pavement Markings," 1961 Interstate Edition.
- All State Route Markers must conform to those shown in the M.S.H.C. "Book of Standard Drawings."
- Guide Signs shall have white legend and border on an Interstate Green background. Legend, border, and background shall be reflectorized. Type A, B, or C removable copy shall be used unless otherwise specified.

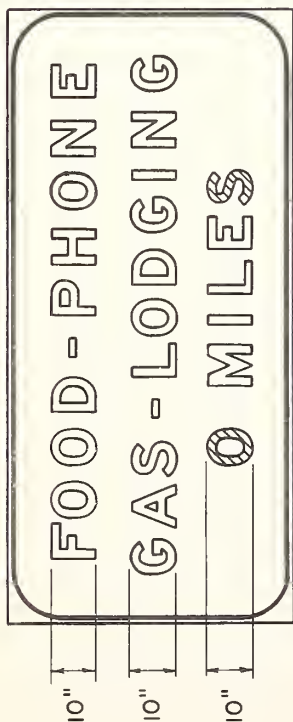




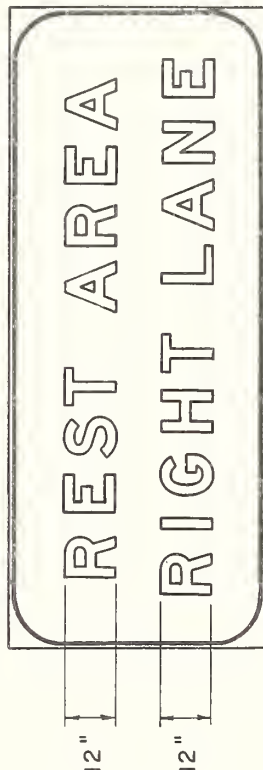
I-2  
12'-0" x 4'-0"

NOTE I-1 & I-2

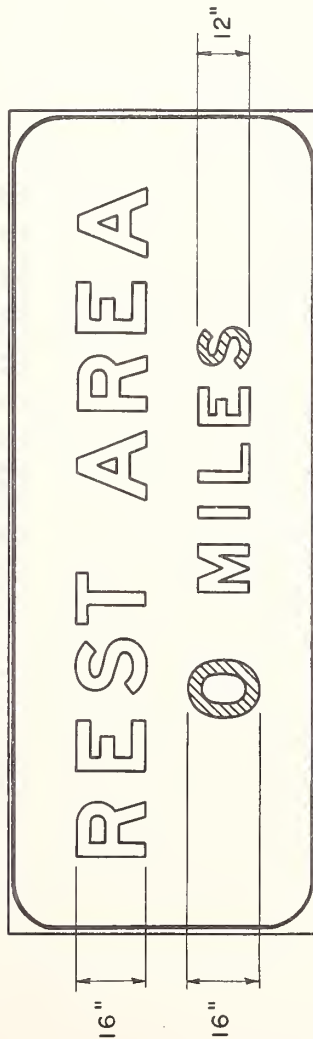
If any of the above services is not available the space it normally occupies is to be left blank. See plan sheet for services to be shown.



I-1  
12'-0" x 5'-6"



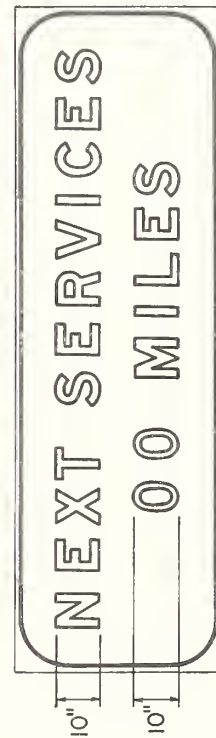
I-4  
13'-0" x 5'-0"



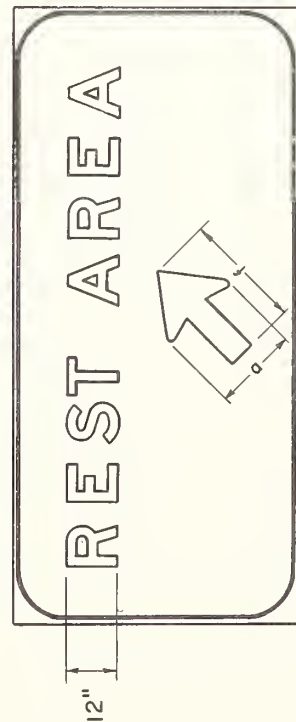
I-3  
16'-0" x 6'-0"

NOTE:

Informational Guide Signs shall have white legend and border on an Interstate Blue background. Legend, border and background shall be reflectorized. Type A, B, or C removable copy shall be used. (See Standard Specifications)



I-6  
13'-0" x 4'-0"

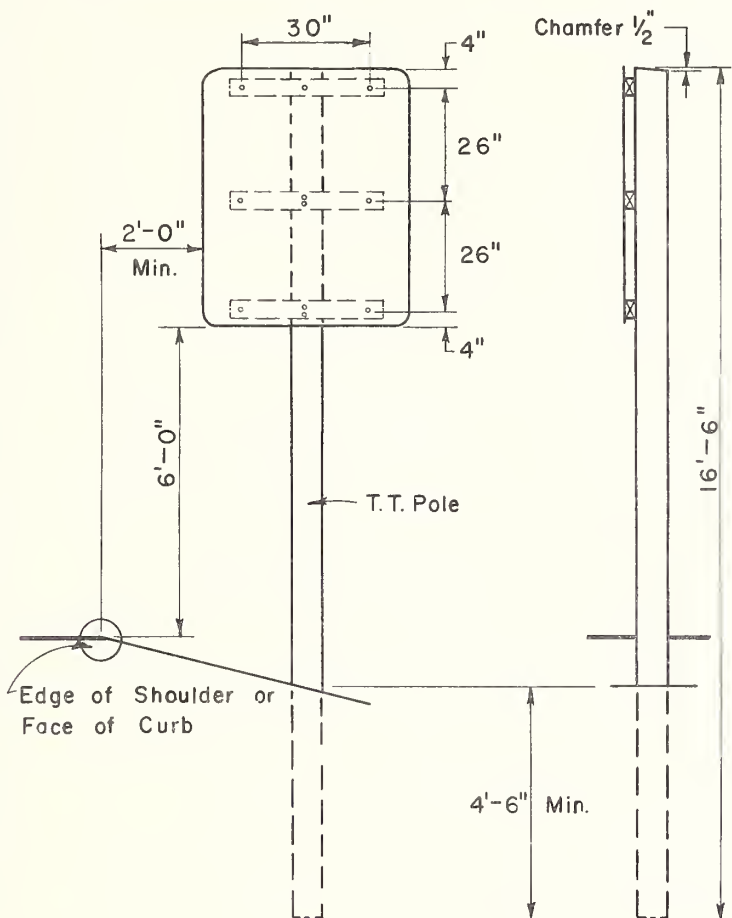


I-5  
12'-0" x 5'-6"

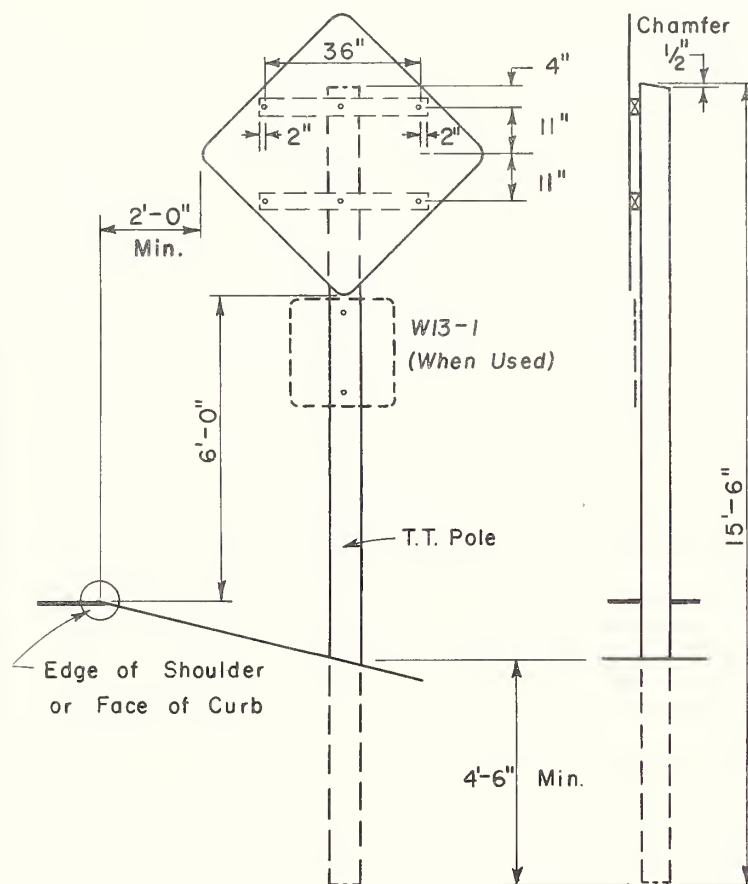
20 1/4 (f) x 17 1/2 (a)  
Type "B" Arrow at  
45° angle



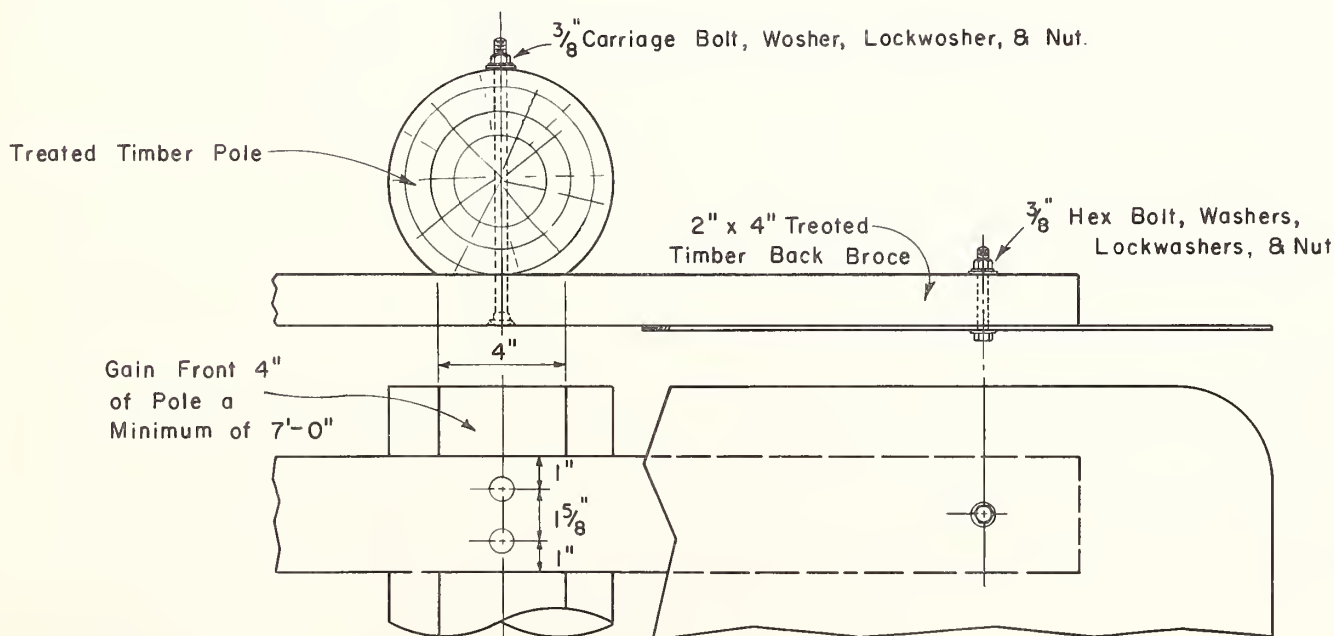
# TYPICAL SIGN ERECTION



TYPICAL ERECTION  
48" x 60" REGULATORY SIGN



TYPICAL ERECTION  
48" x 48" WARNING SIGN

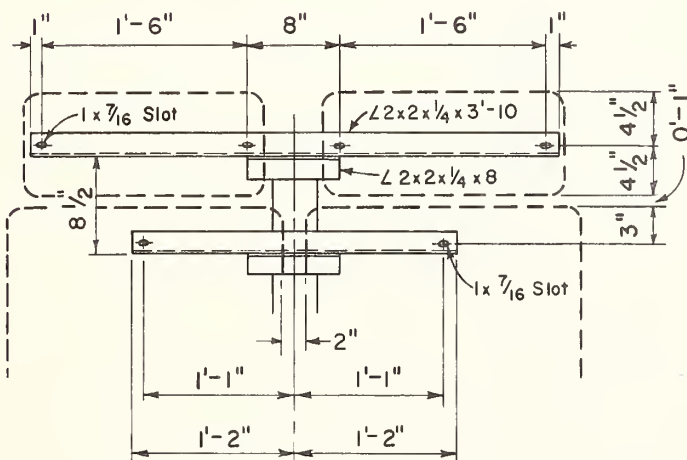
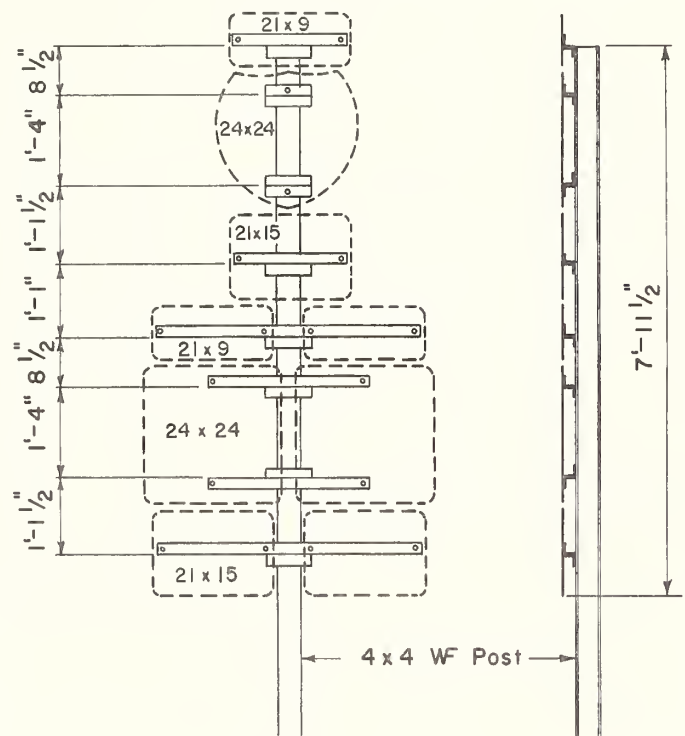
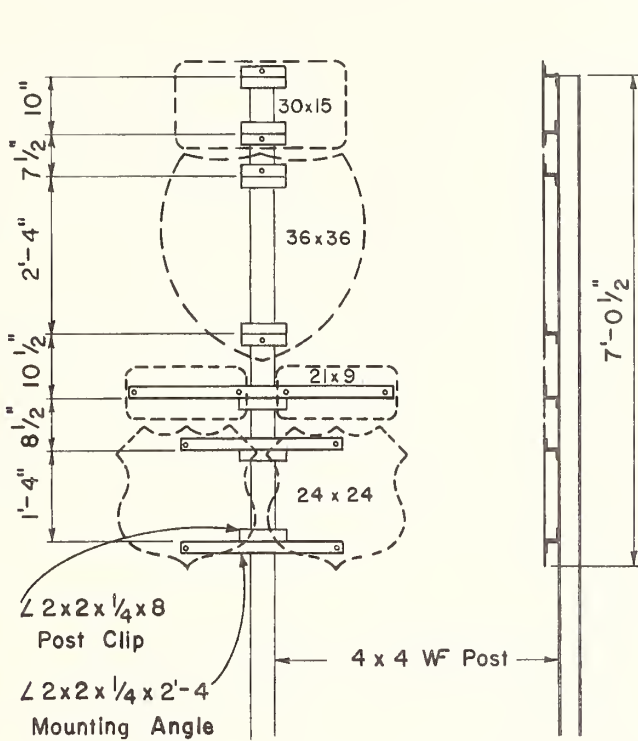


SIGN FASTENING AND BACK BRACE DETAILS







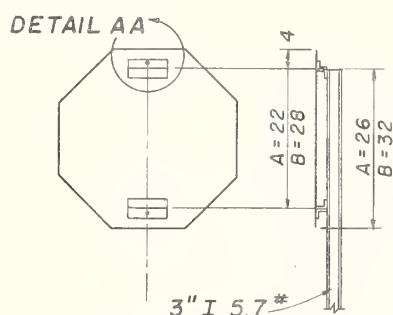


**TYPICAL MOUNTING DETAIL**

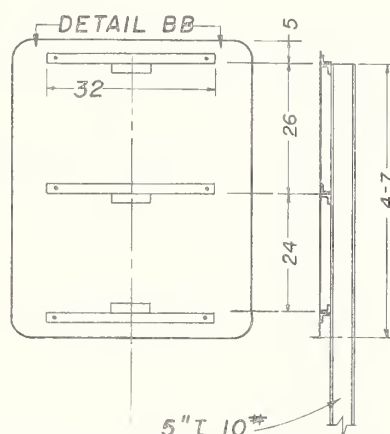
**NOTES:**

1. For mounting of sign panels, past clips and mounting angles refer to detail AA and detail BB on Standard Drawing No. 88-51D
2. Bolt holes for mounting sign panels shall be drilled or punched according to Standard Drawing No. 88-23
3. Assemblies shown are typical installations. Similar assemblies shall be erected in a like manner.
4. Foundation details are shown on Standard Drawing No. 88-51D
5. Type and length of post, mounting height, & foundation depth are shown on the Sign Location and Erection Spec. Sht.
6. Shop drawings shall be approved by the Montana State Highway Commission before fabrication is begun.
7. The widest Route Markers in an assembly shall be separated by 2" horizontally with other panels centered above or below accordingly. Vertical spacing between all panels shall be 1".

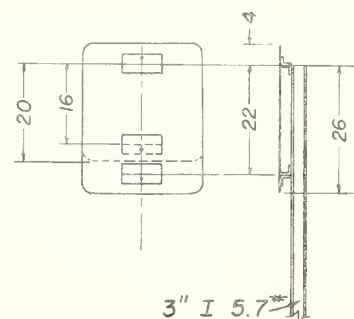




A = 30 x 30 STOP SIGN  
B = 36 x 36 STOP SIGN

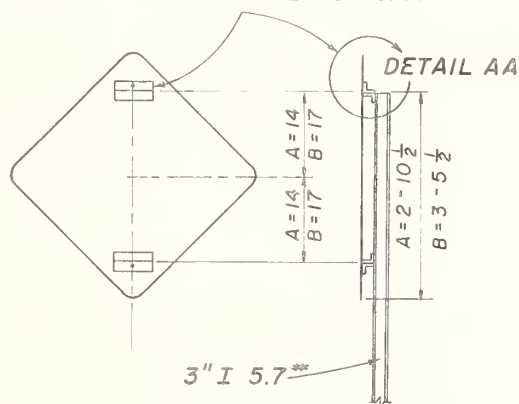


48 x 60 REGULATORY SIGN

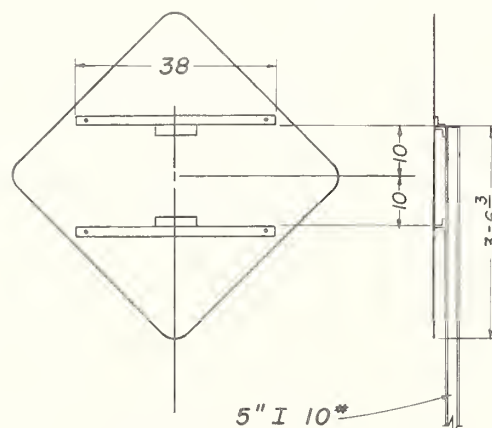


24 x 24 REGULATORY SIGN  
24 x 30 REGULATORY SIGN

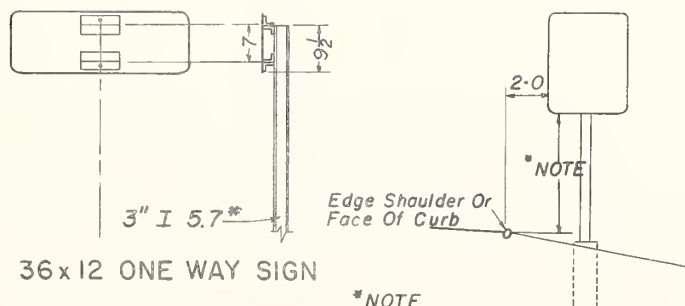
THIS TYPICAL 8" MOUNTING ASSEMBLY  
SHALL BE USED ON ALL SIGNS WHERE  
THERE IS NO HORIZONTAL HOLE SPACING



A = 30 x 30 WARNING SIGN  
B = 36 x 36 WARNING SIGN



48 x 48 WARNING SIGN



36 x 12 ONE WAY SIGN

\*NOTE  
5'-0" In Rural Areas  
6'-0" Along The Interstate  
And on Interchange Ramps & Crossroads  
7'-0" In Urban Areas  
(See Note 1)

#### NOTES

- ① Location Of Signs By Station, Panel Material, Post Type & Length, Mounting Height, And Depth Of Foundation Are Found On The SIGN LOCATION & ERECTION SPECIFICATIONS
- ② Elevations Shown Are Typical Installations. For Similar Installations Not Shown The Length Of The Mounting Angles Shall Be The Horizontal Hole Centers Plus Two Inches. The Vertical Spacing Is Determined By The Vertical Hole Centers.
- ③ The Hole Centers For Each Sign Are Found On STANDARD DRAWINGS NO. 88-21 & 88-22.
- ④ Shop Drawings Shall Be Approved By The MONTANA STATE HIGHWAY COMMISSION Before Fabrication Is Begun.



3/16

1

6

1

1 X 7/16 SLOT IN MOUNTING ANGLE

7/16 Ø HOLE IN POST CLIP

MOUNTING ANGLE  
L 2 X 2 X 1/4

3/16

1

3/8 BOLT, WASHER, LOCKWASHER, & NUT

POST CLIP

STEEL I POST

8

4

1 X 7/16 SLOT

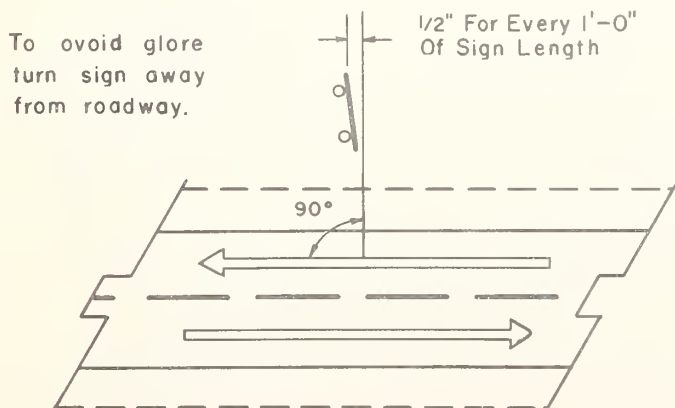
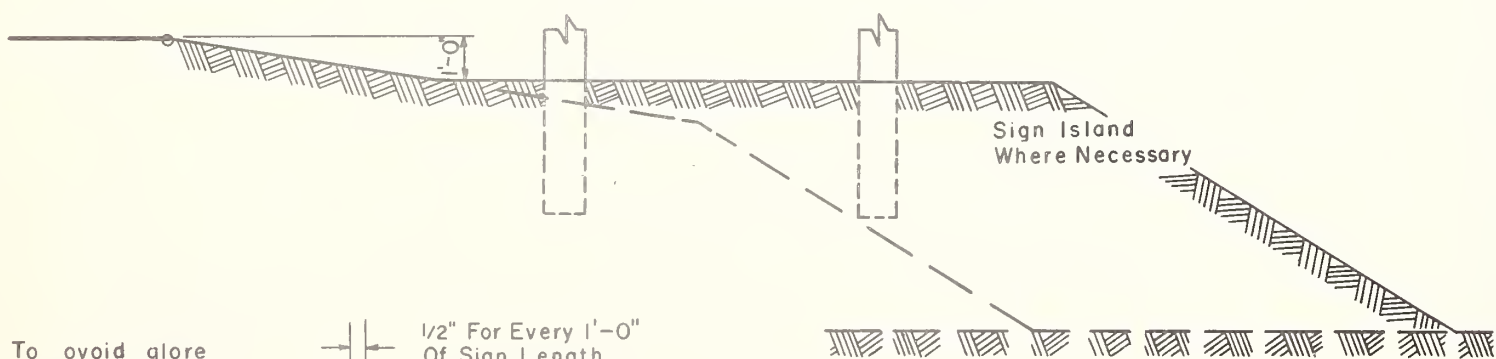
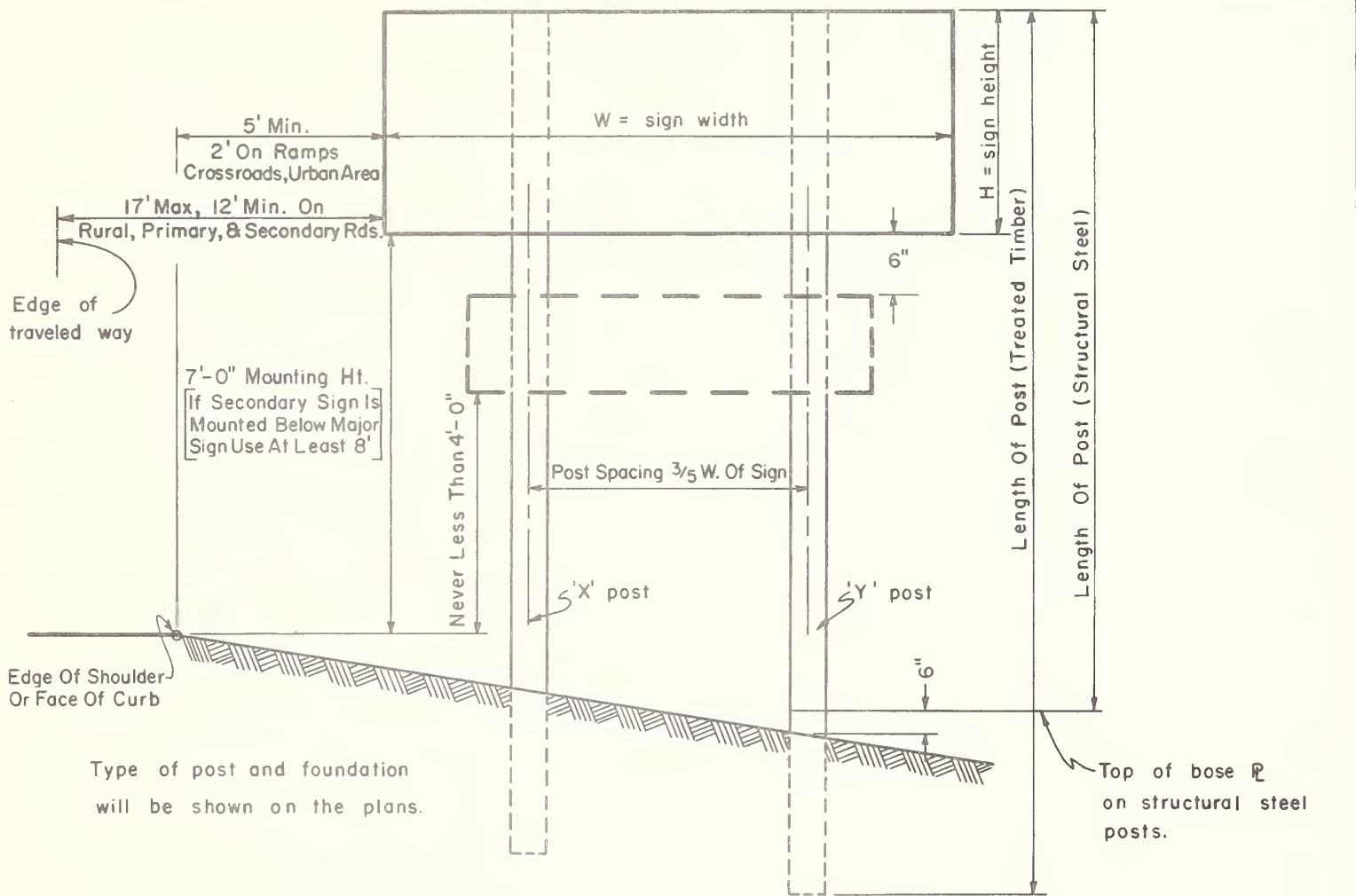
MOUNTING ANGLE  
L 2 X 2 X 1/4 X 8

POST CLIP  
L 2 X 2 X 1/4 X 8

SIGN REMOVED

DETAIL AA









Drawn 8-1-65

Last Revision 3/1/66

STANDARD DRAWING NO. 100-08

State Highway Commission  
Helena, Montana

## TWO TABLE PICNIC SHELTER

Approved  
*Paul Johnson*  
State Highway Engineer

## MATERIAL LIST

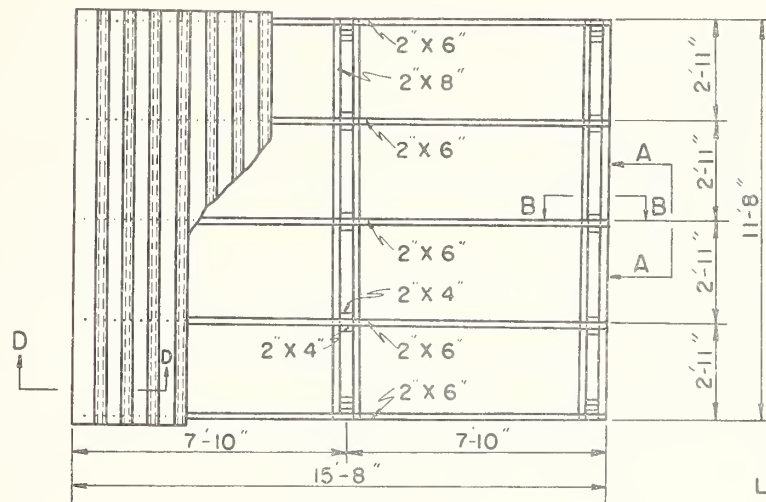
NO	SIZE	COMMERICAL LENGTH	REQUIRED LENGTH	DESCRIPTION
19	1"x4"	12'-0"	12'-0"	LUMBER ROOFING
20	1"x8"	12'-0"	12'-0"	
5	2"x6"	16'-0"	15'-8"	RAFTERS
6	2"x8"	12'-0"	11'-8"	BUILT UP BEAM
2	2"x4"	14'-0"	(24) 1'-2"	
1	2"x4"	12'-0"	(18) 0'-8"	
6	8"x8"	10'-0"	(3) 10'-3" (3) 9'-6"	POSTS
24	#3		4'-8"	REINFORCING STEEL
24	#3		2'-8"	
12	3/16"x0-7 1/2"		0'-3"	STEEL SPLICE PLATES
12	1/2"x0-3"		0'-3"	LAG SCREWS
1	YD 3			CL. A CONCRETE
6	LB'S.			16 d NAILS
4	LB'S.			16 d BOX NAILS
72	1/2" φ			LOCK WASHERS
* 24 6 30 YD 5 4" X 13' X 17' CONC. SLAB				

## NOTE:

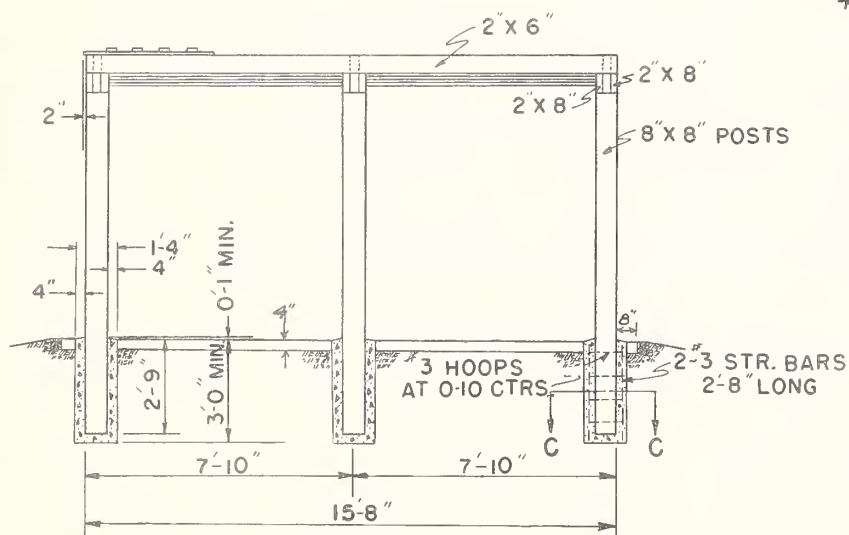
LUMBER ÷ ALL LUMBER SHALL BE COMMERCIAL GRADE NO. 3 OR BETTER.

TREATMENT OF POSTS ÷ THE LOWER 3 1/2 FT. OF THE 8" X 8" POSTS SHALL BE DIPPED IN A 5% SOLUTION OF PENTACHLOROPHENOL FOR AT LEAST 12 CONTINUOUS HOURS.

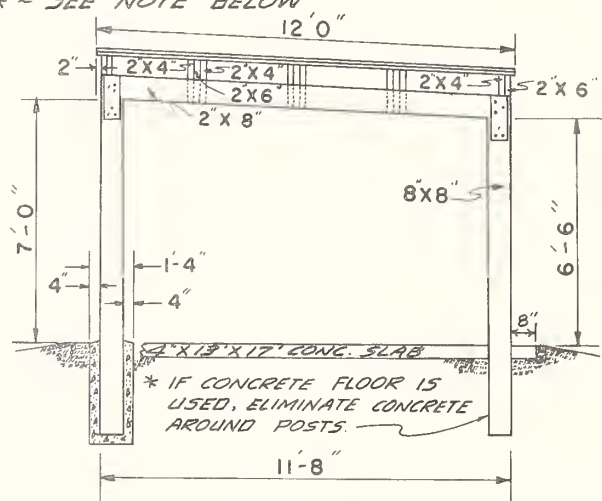
\* - SEE NOTE BELOW



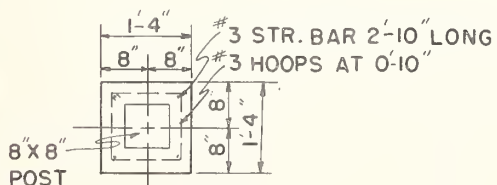
PLAN VIEW



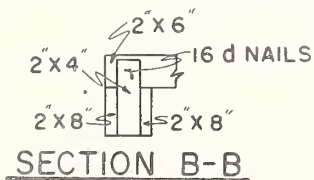
FRONT VIEW



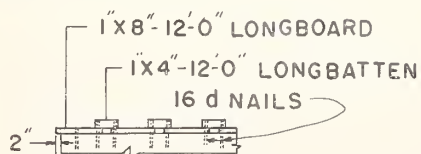
SIDE VIEW



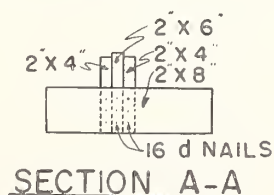
SECTION C-C



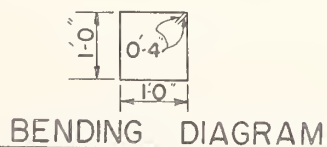
SECTION B-B



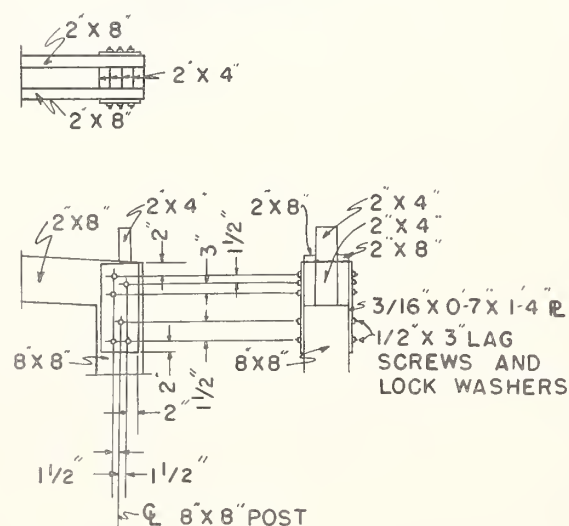
SECTION D-D



SECTION A-A



BENDING DIAGRAM



CORNER DETAILS



## STATE DOCUMENTS


5  
625.704  
H351963, Sept. 1966STATE HIGHWAY COMMISSION  
HELENA, MONTANA 59601  
September 1, 1966STANDARD DRAWING BOOK

We are sending the following additions and/or revisions effective September 1, 1966, to be included in your present Standard Drawing Book, the green covered one, original issue May 1, 1963:

57-05	Embankment Protector - Revised 9-1-66
57-06	Concrete Slope Protection - Added 9-1-66
79-01	Farm Fence - Revised 9-1-66
80-01	Chain Link Fence - Revised 9-1-66
81-01	Wire Fence - Interstate Type - Revised 9-1-66
81-02	Wire Fence - Interstate Type - Revised 9-1-66

## NOTE:

- (1) Add these drawings to your book.
- (2) We are also sending a complete new index pages 1 and 4. You should destroy the old index pages 1 and 4.

  
MORRIS GRIFFITH  
Office Engineer

MONTANA STATE LIBRARY  
930 East Lyndale Avenue  
Helena, Montana 59601



STATE HIGHWAY COMMISSION  
HELENA MONTANA

Date Issued  
April 1, 1965  
Rev. 5-1-65  
Rev. 8-1-65  
Rev. 3-1-66  
Rev. 9-1-66

Transmitted herewith are the Standard Drawings which are supplementary to the Standard Specifications. A new Table of Contents has been made.

The original Drawings became effective May 1, 1963 and this tabulation also includes the subsequent revisions, additions and deletions. In the future when new drawings are sent, the superseded drawings should be retained until no longer applicable.

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07-03	Revised February 1, 1964
07-03	Revised April 1, 1965
07-08	Signing & Marking Bridge Ends & Obstructions
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14-02	Measurement of Roadway Rolling - Added 11-1-63
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20-05	U-Turn Median Openings - Added 5-1-65
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39-01	Revised 3-1-66
39-02	8" P.C. Concrete Pavement-Expansion Joints & Dowel Sleeves
39-03	8" P.C. Concrete Pavement-Sawed Joints
39-03	Revised 3-1-66
39-04	8" P.C. Concrete Pavement-Construction Joint & Header
39-04	Revised 3-1-66
39-09	8" P.C. Concrete Pavement-Keyway Joints
39-09	Revised 3-1-66
39-10	P.C. Concrete Pavement-Tapered Panel Connection
39-10	Revised 8-1-63
39-12	P.C. Concrete Pavement - Bridge Approach Panel
39-13	P.C. Concrete Pavement - Skewed Bridge Approach Panel
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51-01	Grading Rules for Timber Posts
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57-03	Riprap Quantities
57-04	Embankment Protection
57-05	Embankment Protector - Added 8-1-65
57-05	Revised 9-1-66
57-06	Concrete Slope Protection - Added 9-1-66

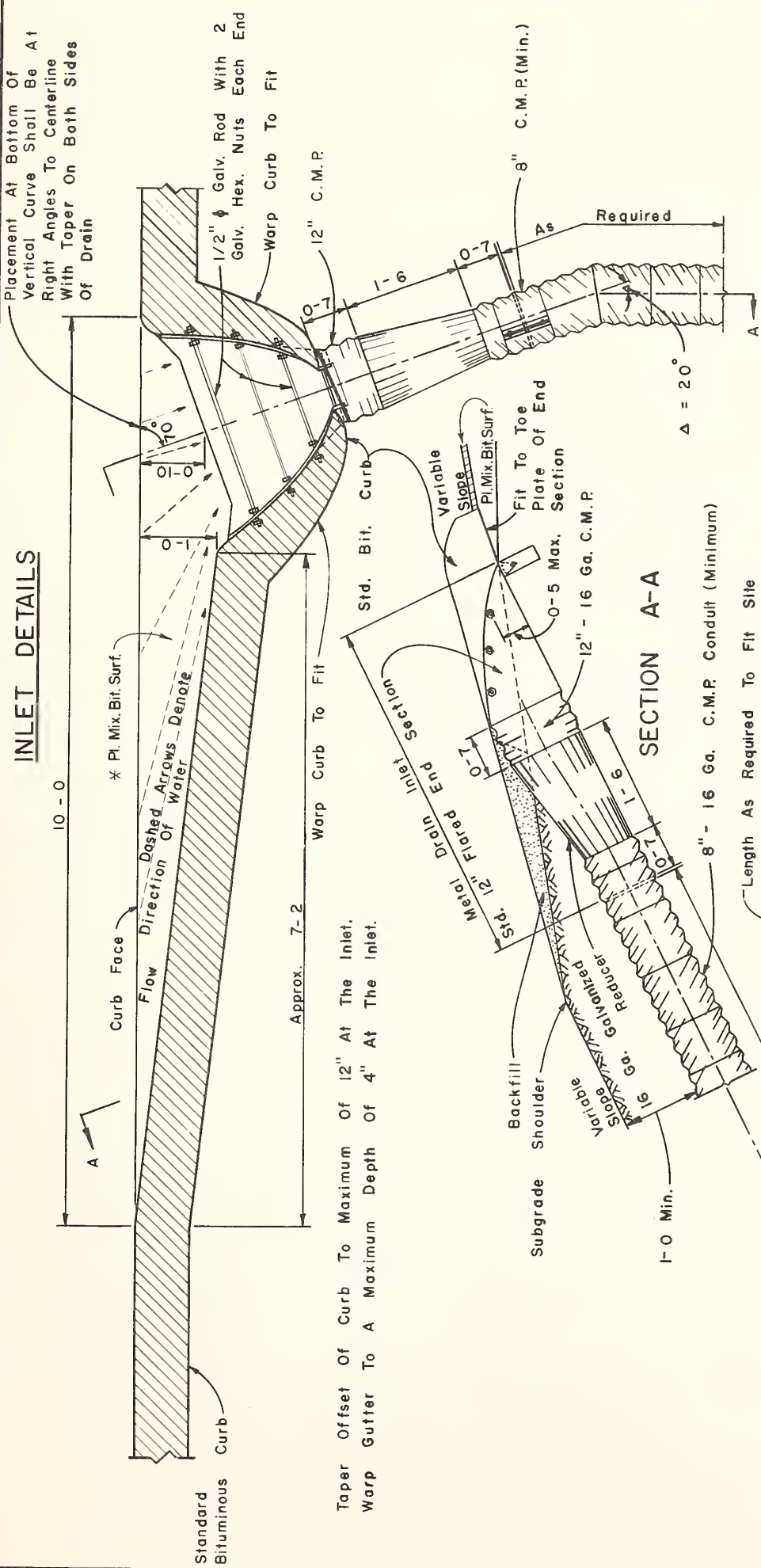




Date Issued  
April 1, 1965  
Rev. 8-1-65  
Rev. 9-1-66

76-01	Metal Bin-Type Retaining Wall
76-02	Concrete Crib Retaining Wall - Added 8-1-63
79-01	Farm Fence
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79-01	Revised 9-1-66
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87-12A	Type III-A Standard
87-13	Type II Standard
87-13A	Type II-A Standard
87-14	Detector Installation Details
87-15	Cable Splicing Detail
87-17	Isolux Lines Of Minimum Horizontal Foot Candles
87-18	Typical Wiring Diagram of Service Equipment
87-19	Guard Post Detail
87-42	Lighting Bracket and Installation Details





### GENERAL NOTES

Conduit May Be Either Circumferential Or Helical, θ And Δ Shall Be As Shown Unless Otherwise Specified In The Plans Or By The Engineer.

Contractor Shall Not Order Pipe Until Directed By The Engineer.

Flared End Section May Be Called For On Outlet End When Slopes Are 3:1 Or Flatter.

\* Included With Roadway Quantities.

Embankment Protector Shall Be Bid As Unit Price Bid Per Lin. Ft.

The 12" Flared End Section, 12" C.M.P., 12"-8" Reducer, 8" C.M.P., And Bends, Are To Be Included In Total Length Of Embankment Protector.

All Other Hardware Shall Be Included In The Unit Price Bid Per Lin. Ft. Of Embankment Protector.

### OUTLET DETAILS

Natural Channel Elevation

Varies 5'-0" Min.

5'-0" Width

2'-0"

Variable -- Depends Upon Slope

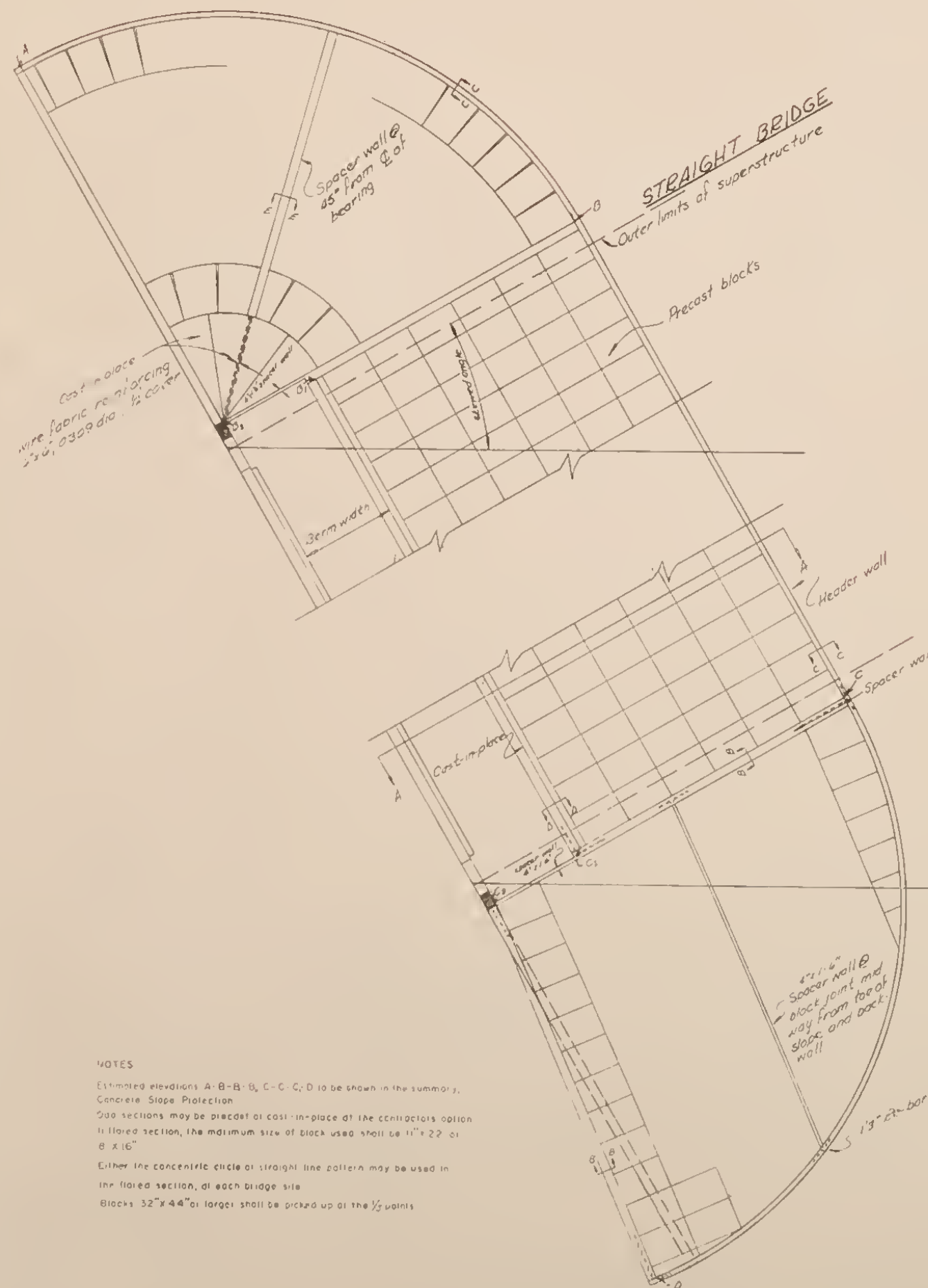
1'-0" Min.

8" - 16 Ga. C.M.P. Conduit (Minimum)

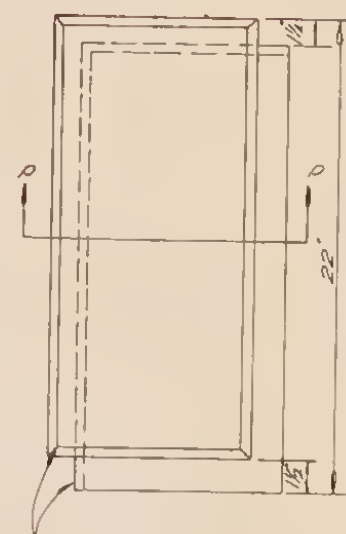
θ = 25°

Approx. 1 1/2 Cu. Yd. Type 3 Bank Protection --- To Be Placed In Manner Best Suited To Fit Existing Conditions.

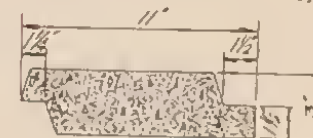
SEE REVERSE SIDE OF THIS SHEET FOR ADDITIONAL INFORMATION.



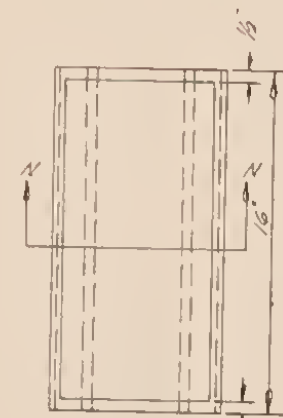
Block Tolerance:  $\pm \frac{1}{8}$ "



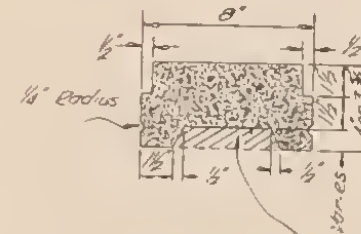
All chamfer  $\frac{1}{2}$ " x  $1\frac{1}{2}$ "  
 Lap Joint\*  
 (See Section C-C)



SECTION P-P

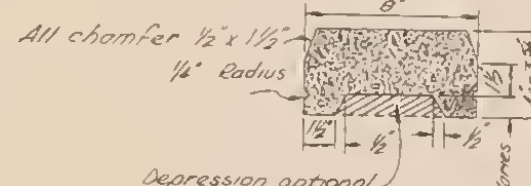


Rectangular Joint



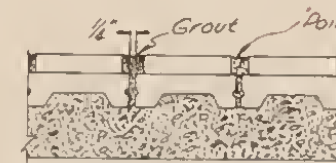
Depression optional

V-Joint

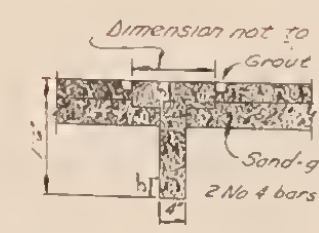


Depression optional

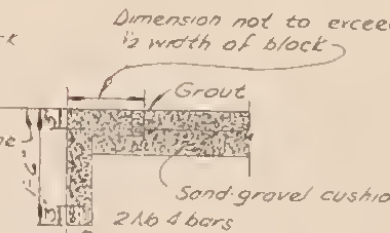
SECTION N-N



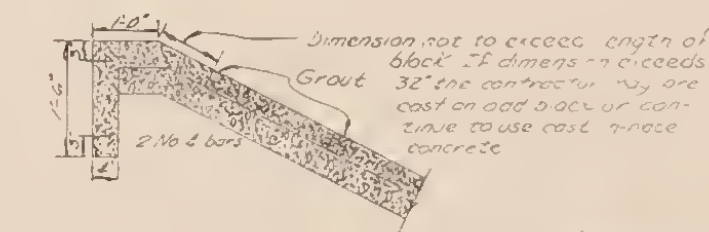
Typical placement of the rectangular & V joint



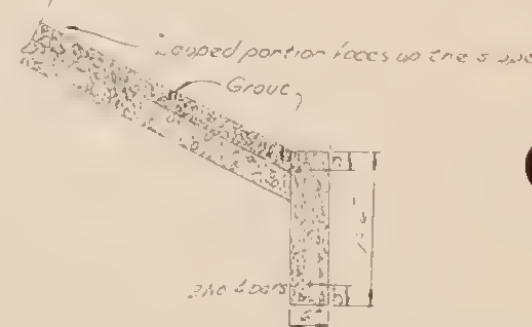
SECTION E-E



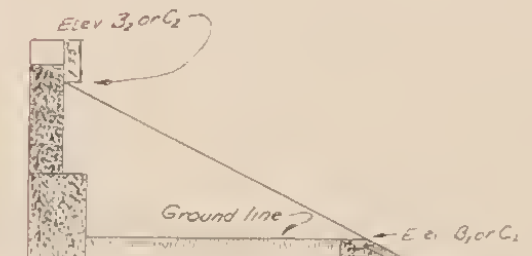
SECTION B-B



SECTION D-D



SECTION C-C



SECTION A-A

NOTES

Estimated elevations A-B-B, C-C, D-D to be shown in the summary.  
 Concrete Slope Protection  
 200 sections may be placed at cast-in-place at the contractor's option.  
 If placed section, the maximum size of block used shall be 11" x 22" or 8" x 16".  
 Either the concentric circle or straight line pattern may be used in the flared section, at each bridge site.  
 Blocks 32" x 44" or larger shall be picked up at the  $\frac{1}{2}$  joints.

NOTES

**Precast Blocks:** Rectangular blocks shall be placed with the longest dimension running up the slope. Blocks at any site shall be the same size (except as noted) and type.  
 All blocks shall be sound and free from cracks or other defects that would interfere with the proper placing of the unit, or impair the strength or permanence of the construction. Any blocks broken or damaged so that the function of the block is impaired before the final inspection of the finished project shall be replaced by the contractor at his expense.  
**General:** Concrete headers and cutoff walls shall be included in the slope paving and paid for in square yards of slope paving. Concrete used shall be class "D".

**Size of Precast Blocks:** The contractor may choose the type and size of blocks; top blocks may be 11" x 22", 22" x 44", or 44" x 66". Rectangular or V-joint blocks may be 8" x 16", 16" x 32", or 32" x 48".

**Placement of Slope Protection:** The concrete slope protection shall be placed after the structure has been finished and backfill around the structure is in place.

**Embankment Preparation:** The embankment slope shall be cleared of all debris, and rubble. When a cushion is used the embankment slope shall be leveled to a reasonably uniform slope. Where no cushion is used, level to the slope indicated in the bridge plans. All base material shall be compacted to the satisfaction of the engineer. A minimum of four inch sand-gravel cushion and leveling course shall be placed on the prepared embankment slope. Adjacent slope areas shall be left in a smooth, uniform condition.

**Interrupted Block Pattern:** The areas ground banks or where the regular block pattern is interrupted shall be constructed with cast-in-place concrete and shall be marked into sections with an approved gravel to match the pattern of the surrounding blocks. An approved one-foot in 1 expansion joint filler material shall be used where the blocks or cast-in-place concrete abutts against any part of the structure.



SECTION - 50 - SLOPE AND BANK PROTECTION

This section shall be supplemented by the following:

CONCRETE SLOPE PROTECTION

Concrete slope protection shall conform to the requirements of Standard Drawing No. 57-06 with the following additional provisions.

The precast blocks and cast in place concrete shall be constructed of Class "DD" concrete conforming to Article 40.02 of the standard specifications.

PREPARATION OF SUBGRADE

The subgrade shall be formed by trenching and shaping in conformity with the details and required elevations set forth on the plans and standard drawings as directed by the engineer. The excess excavated material shall be disposed of as directed by the engineer.

The subgrade shall be thoroughly compacted, to insure its stability, to the density requirements of Article 11.05 of the standard specifications, and shall be trimmed to a reasonably smooth plane to the satisfaction of the engineer.

JOINT MORTAR

The joints, between units, shall be filled with cement mortar conforming to Article M-150.02 (3) of the standard specifications with the additional provision that mortar sand shall conform to Article M-100.01 (A). The blocks shall be wet down for at least one hour before placing the mortar.

Mortar shall be placed from the bottom to top and sufficient mortar shall be used and worked with suitable tools to completely fill the joints between the units. Any excess mortar shall be removed from the surface.

Joint mortar work shall not be accomplished in freezing weather. When placing is done, in hot dry weather, the work shall be protected by keeping it moist with water or approved membrand curing compound for three days following its completion. Any work damaged by frost or because of improper protection shall be removed and replaced at the contractor's expense.

The precast blocks and cast-in-place concrete shall be made with air-entrained admixture conforming to Article 40 04 (A) (2) of the standard specifications.

SAND-GRAVEL CUSHION

The material for the sand gravel cushion shall conform to Article M-100.11 of the standard specification with the additional provision that all material shall pass a  $1\frac{1}{2}$  inch sieve.

METHOD OF MEASUREMENT

Concrete slope protection will be measured by the area in square yards of exposed surface, to the nearest one-tenth ( $1/10$ ) square yard, complete and accepted in place. The measurement shall include precast blocks, concrete headers, cut-off walls and cast-in-place concrete. All measurements will be made parallel to the surface of the concrete slope protection.

Sand-gravel cushion material will be measured by the cubic yard, used in the completed and accepted work compacted in place.

BASIS OF PAYMENT

Concrete slope protection will be paid for at the contract unit price bid per square yard, which price and payment shall be full compensation for all excavation, preparation of subgrade, trimming of slope, disposal of surplus material and for furnishing and placing all materials and for all labor and equipment necessary to complete the work, including concrete headers, and cut-off walls but not including sand-gravel cushion.

Sand-gravel cushion will be paid for at the contract unit price bid per cubic yard, which price and payment shall be full compensation for furnishing and placing the material as specified. While sand gravel cushion material may not be specified on the plans, such an item may be included in the proposal as an arbitrary quantity for the purpose of providing a unit bid price for any quantity of bedding material that may be required. The quantity shown in the proposal, under such a condition, will not be guaranteed to be required or used and the Commission reserves the right to increase, decrease or omit any or all of the item and no additional compensation will be allowed by reason thereof.



Drawn 4-3-58

Last Revision 8/15/61; 5/1/63; 4/1/64; 9-1-66

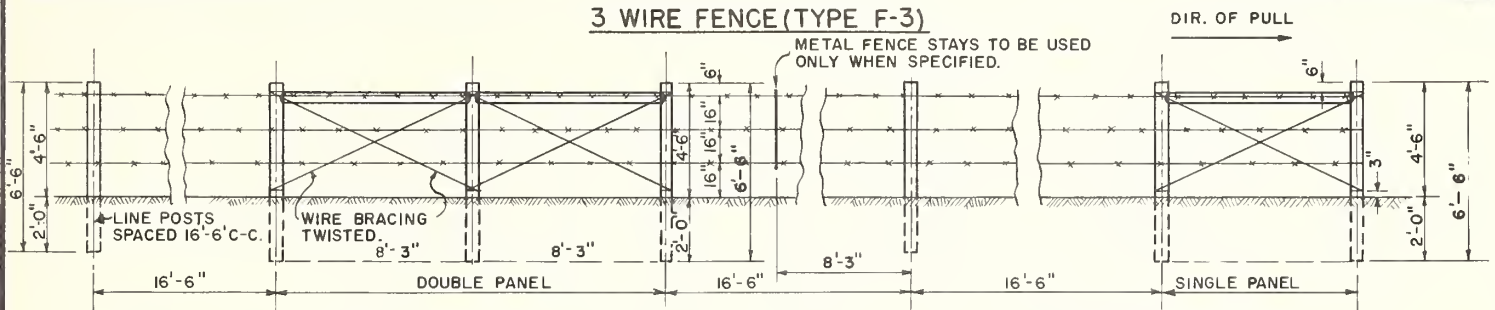
STANDARD DRAWING NO. 79-01

State Highway Commission  
Helena, Montana

# FARM FENCE

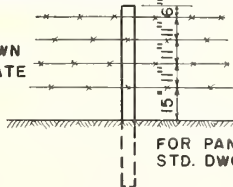
Approved  
State Highway Engineer

## 3 WIRE FENCE (TYPE F-3)

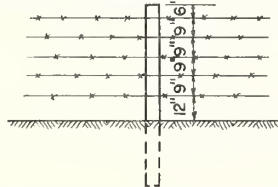


## 4 WIRE FENCE (TYPE F-4)

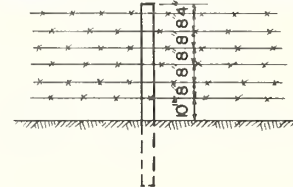
ALL WIRE SPACING SHOWN IS APPROXIMATE



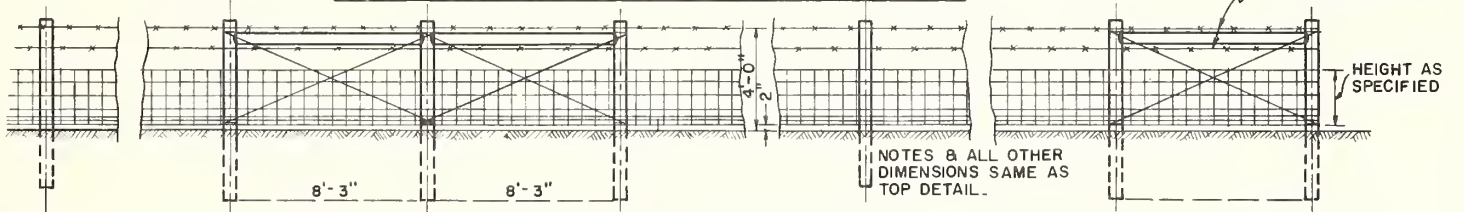
## 5 WIRE FENCE (TYPE F-5)



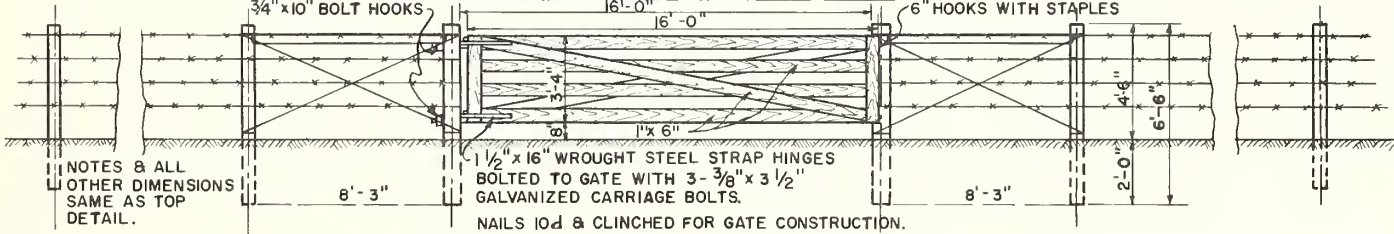
## 6 WIRE FENCE (TYPE F-6)



## BARB WIRE & WOVEN WIRE FENCE (TYPE F-2)

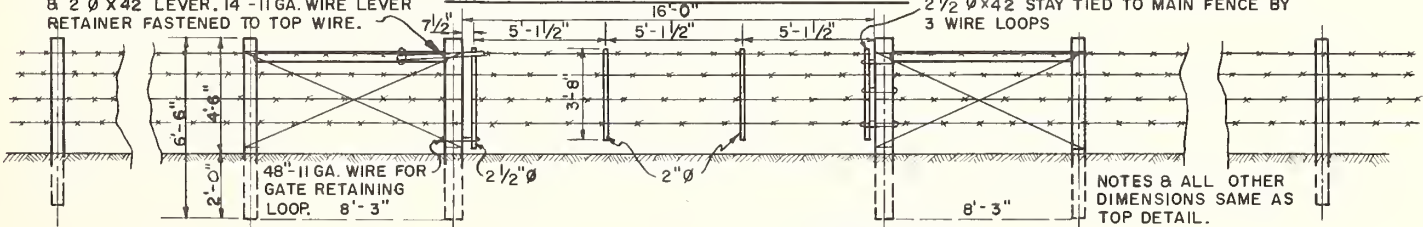


## FARM ENTRANCE GATE (TYPE G-1)

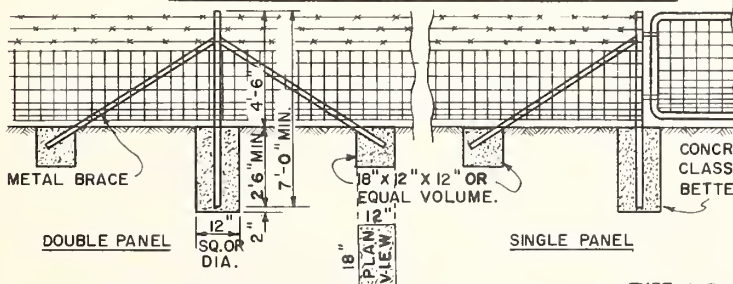


46" NO. 2 ELECTRICALLY WELDED TWIST LINK CHAIN SECURELY STAPLED TO POST & 2" x 42" LEVER, 14"-11 GA. WIRE LEVER RETAINER FASTENED TO TOP WIRE.

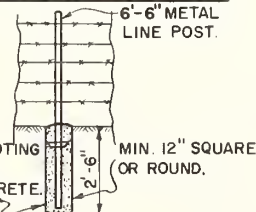
## FARM ENTRANCE GATE (TYPE G-2)



## STEEL POSTS & BRACES IN CONCRETE



## METAL POST CONCRETE FOOTING



## METAL LINE POSTS

6'-6" LONG, 1.33 LBS. PER FT, NOMINAL FACTORY PAINTED OR GALVANIZED.

## CORNER, GATE & END POSTS

7'-0" LONG (NOMINAL)

## TERMINAL POST

SHALL BE AT THE END OF ANY RUN OF WIRE OR AT ANY STRETCH PANEL.

TYPE G-3 GATE IS METAL. A GOOD SUBSTANTIAL GATE, COMMERCIALY AVAILABLE AND IN GENERAL USE.

## NOTE:

A DEAD MAN MAY BE A CONCRETE BLOCK, A CAST-IN-PLACE CONCRETE BLOCK, A ROCK OR OTHER APPROVED OBJECT. WEIGHING AT LEAST 150 LBS, AND COVERED AT LEAST 2 FEET

## NOTE: (STEEL POSTS)

EACH CORNER, END GATE, OR PULL POST AND EACH BRACE SHALL BE SET IN CONCRETE AND BRACED AS INDICATED.





Drawn 12-23-57

Last Revision 12/11/61; 9/1/62; 9-1-66

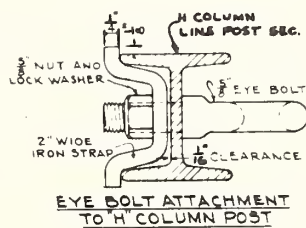
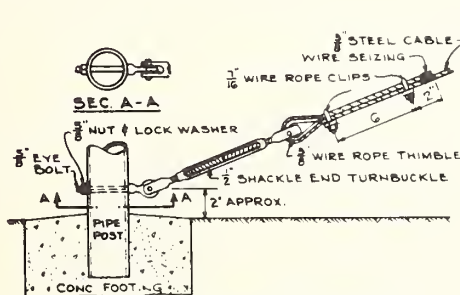
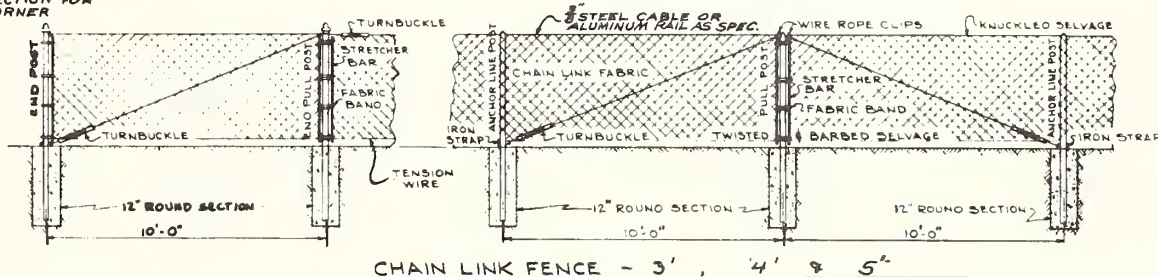
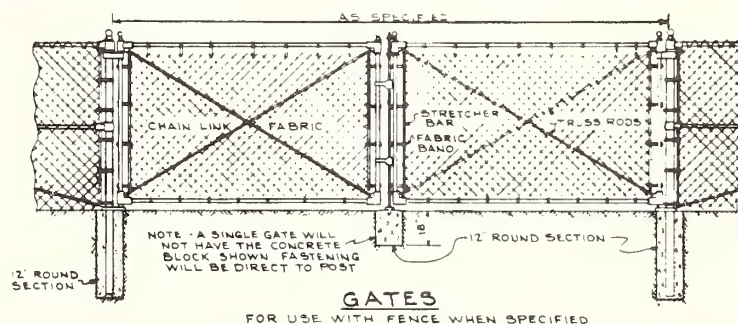
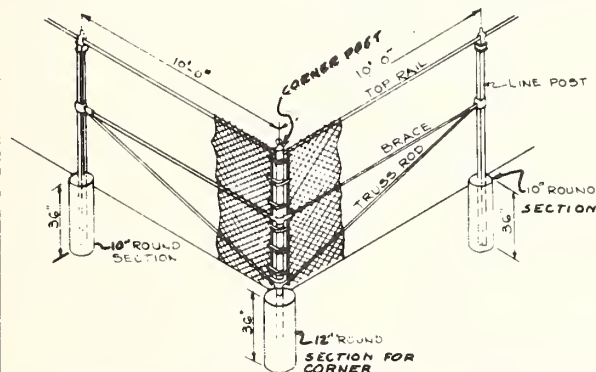
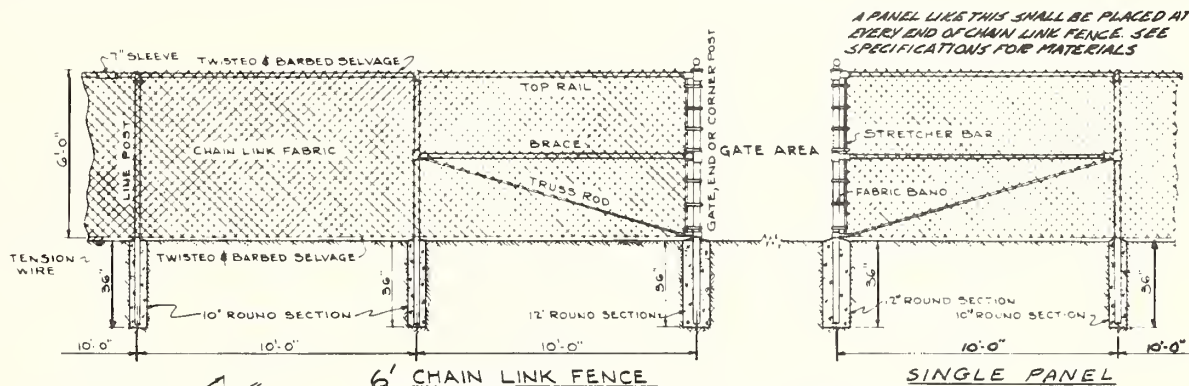
STANDARD DRAWING NO. 80 - 01

State Highway Commission  
Helena, Montana

# CHAIN LINK FENCE

Approved

State Highway Engineer



SEE STANDARD SPECIFICATIONS FOR FURTHER REQUIREMENTS.

GATES ARE INCLUDED ON THIS STANDARD FOR USE IN SPECIAL CASES ONLY. THEY SHALL NOT BE INSTALLED AT ANY LOCATION UNLESS SPECIFIED BY THE ENGINEER.

LINE POSTS ON 3 FOOT AND 4 FOOT FENCE, OTHER THAN THE TWO POSTS ADJACENT TO PULL POSTS, NEED NOT BE SET IN CONCRETE BUT MAY BE DRIVEN OR DRILLED INTO SOLID EARTH.

PULL POST BRACING ON 6 FOOT FENCE SHALL BE SAME AS CORNER BRACING SHOWN IN DETAIL UPPER LEFT.

ALL CONCRETE IS CLASS "F" OR BETTER.

THE ESSENTIAL FEATURES SHOWN HEREON ARE APPLICABLE TO ALUMINUM ALLOY FENCE. ALUMINUM ALLOY FENCE WILL NOT USE CABLE AT TOP BUT WILL REQUIRE TOP RAIL FOR ALL HEIGHTS.

DOUBLE PANELS SHALL BE INSTALLED NO MORE THAN 300 FEET APART ON TANGENT AND USED FOR PULLING. SUCH PANELS SHALL BE PLACED AT EACH END OF EACH CURVE SHARPER THAN 5° AND BE APPROXIMATELY EVENLY SPACED BETWEEN, ABOUT 20° OF CENTRAL ANGLE (10° DEFLECTION) APART, BUT NOT MORE THAN 250 FEET APART ON ANY CURVE. SEE SPECIFICATIONS FOR MATERIALS.

CABLE ATTACHMENT DETAILS for 3 ft., 4 ft. & 5 ft. fence

HEIGHT OF FABRIC	WIRE FABRIC ABOVE GROUND	DEPTH OF POST IN CONCRETE (MIN.)	POST IN CONC. (MIN.)
6'	1"-2"	36"	32"
5'	1"-2"	36"	32"
4'	1"-2"	30"	26"
3'	1"-2"	30"	26"



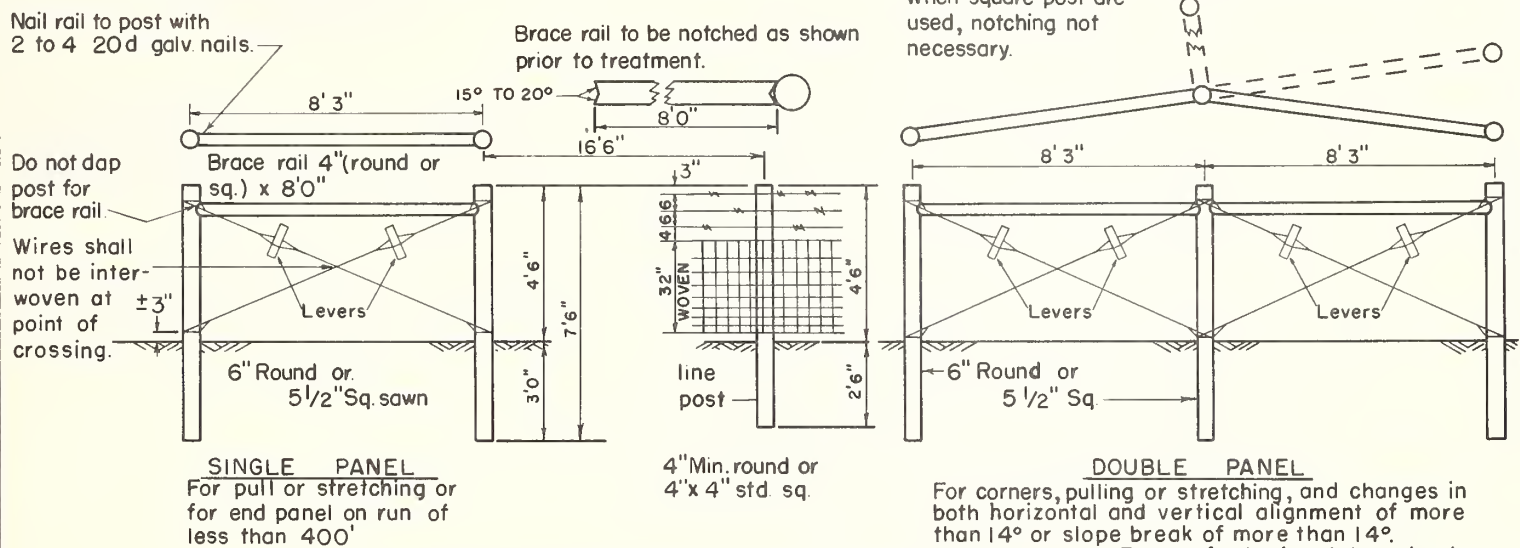
State Highway Commission  
Helena, Montana

WIRE FENCE - INTERSTATE TYPE

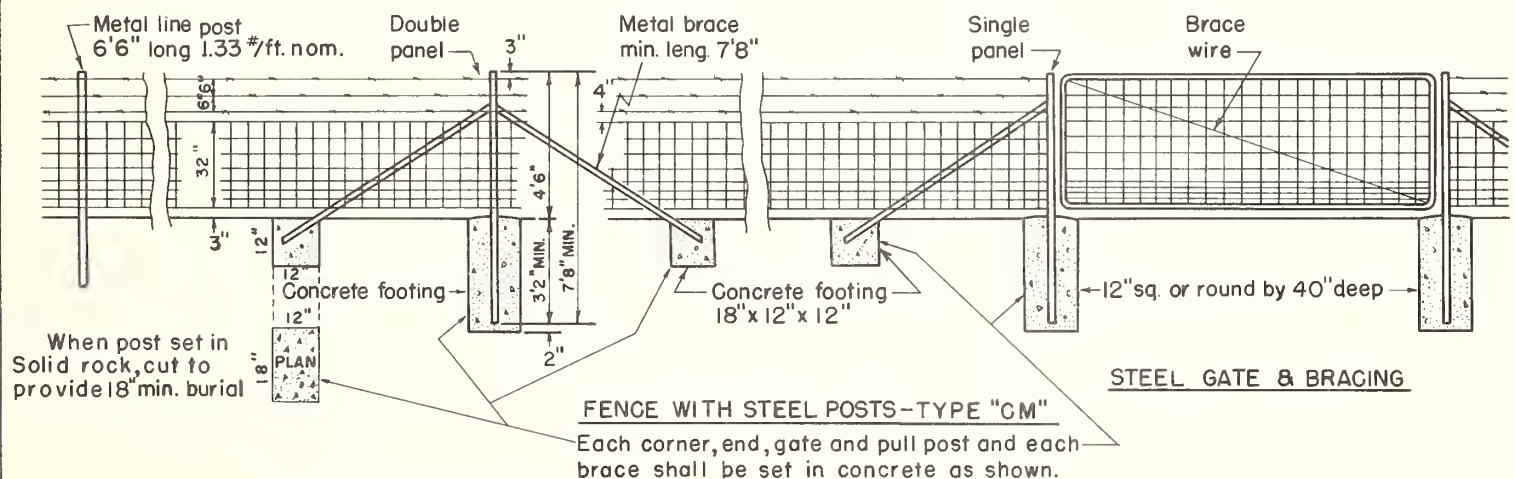
Approved

State Highway Engineer

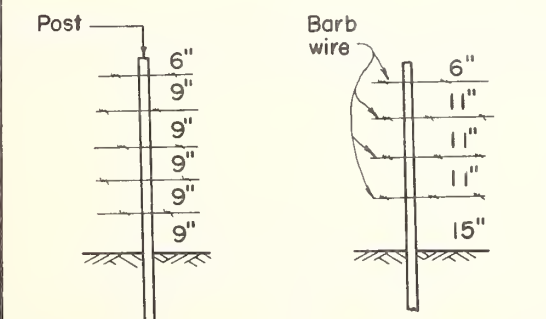
See Std. Dwg. No. 81-02



"STRAIGHT RUN" FENCE WITH WOOD POSTS-TYPE "CW"



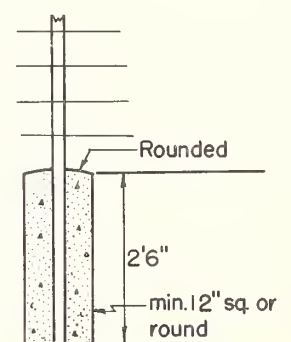
### STEEL GATE & BRACING



NOTE:

A deadman may be a precast concrete block, a cast in place concrete block, a rock or other approved object — weighing at least 150 lbs — and covered at least 2 feet.

"Terminal Post" shall be at the end of any run of wire or at any stretch panel.



Securely tie all wires to post.

METAL POST-CONC. FOOTING

"M" indicates metal post.  
"W" indicates wood post.  
Braces, corners, deadman  
and other features same  
as "CW" and "CM" fence.

Wire stay half-way between posts.  
44" on "CB5"  
42" on "CB4"

TYPE "CB4" & "CB5" WIRE FENCE

Post spacing measured generally parallel to ground.

Line post shall normally be spaced 16'6" apart. Also 16'6" from brace or panel posts.

24" wire stay to be placed halfway between posts, excepting panels on "CM" and "CW" fence.

Maximum run between panels 330' for woven wire; 990' for barb wire.

Fence with wooden posts to have one metal post, in place of a wooden line post, in each 500' run for lightning protection.

Type "CW" panels (wood) will be used on type "CM" fence instead of steel panels when so specified.

NOTES:

5. All fence wire to be placed on pasture side of posts except that on curves, the wire shall be placed on the outside of the curve.

In areas subject to high velocity winds and moving debris, wires may all be placed on windward side of posts. Except on curves.

All concrete shall be class "F" or better.

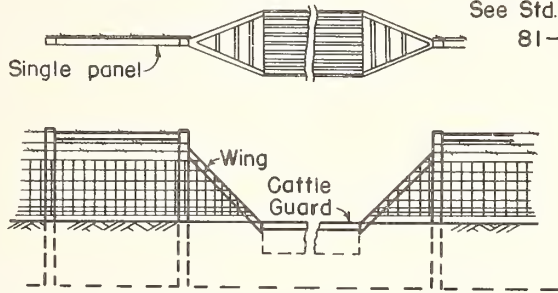
Maximum bow in wood posts-- 2" in 7'.





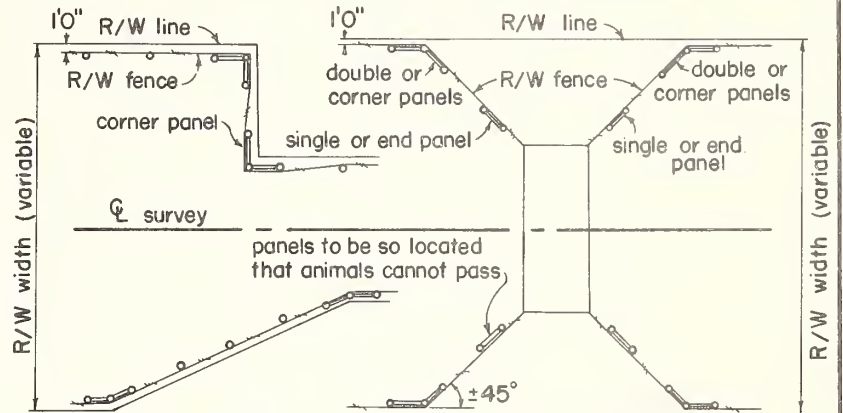
# WIRE FENCE - INTERSTATE TYPE

See Std. Dwg. No.  
81-01



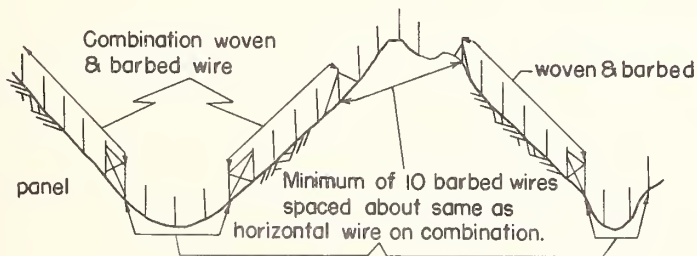
## FENCE CONNECTION TO CATTLE GUARD

For detail of cattle guard see standard drawing.  
Fence wire shall be securely fastened to the wings  
and so arranged that animals cannot pass.



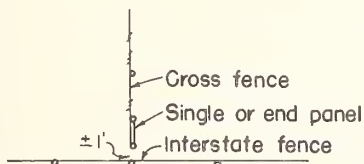
PLAN OF FENCE  
(at change in R/W width)

PLAN OF FENCE  
(at drainage structure or stock pass)

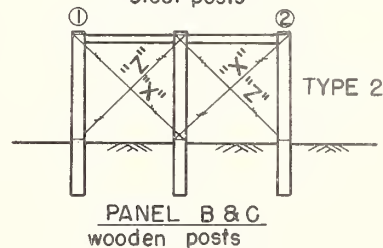
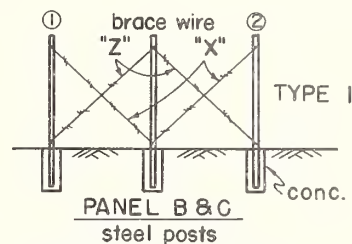
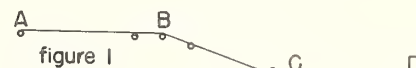


## FENCE CONSTRUCTION ON SHARP VERTICAL CURVES

To avoid trying to conform woven wire to uneven terrain.



LAYOUT OF CROSS-FENCE CONNECTION



When fence alignment is like figure 1, do not fasten wire at "A" and stretch at "D" (or the reverse). This will cause fence to lean sideways at "B" & "C".

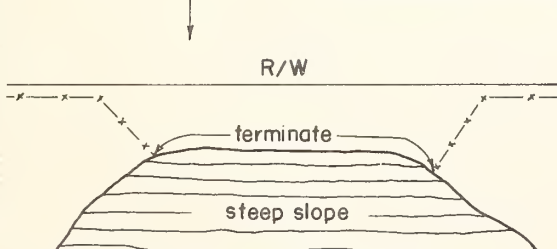
Type 1 and 2 panels will be paid for as "double panels." Brace wires shall be the same pattern for single panels.

When using wooden posts (here the contractor will be permitted to use type 2 panel if he so elects) a double panel will be installed. When using steel posts, extra posts must be installed at ① and ②, 8'-10' from the center post. All posts must be the heavy type as for panels.

Brace wire "Z" may be double 9 gage wire twisted or 4 12 gage barbed wires twisted. Brace wire "X" shall be 6-9 gage wires or 12-12 gage wires twisted.

Stretching shall be done between "A" & "B" and "C" & "D" and "B" & "C" using post ① or ②, which ever is nearest. Wire between ① & ② in each panel to be stretched by hand or small tools. For horizontal angles of less than 30° use 2-single panels in place of one double panel.

## PERMISSIBLE FENCE LAYOUTS WHERE STEEP BACKSLOPES OR BANKS EXIST



Slope must be steep enough to deter passage of undesirable trespassers.

